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VOLTA REVIEW

VOL. XVI FEBRUARY, 1914 NO. 2

PRINCIPLES OF SPEECH AND DICTIONARY OF SOUNDS

By ALEXANDER MELVILLE BELL

THE PSYCHOLOGY OF SPEECH-READING

By JERRY ALBERT PIERCE

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A tablet in the Congregational House, Boston

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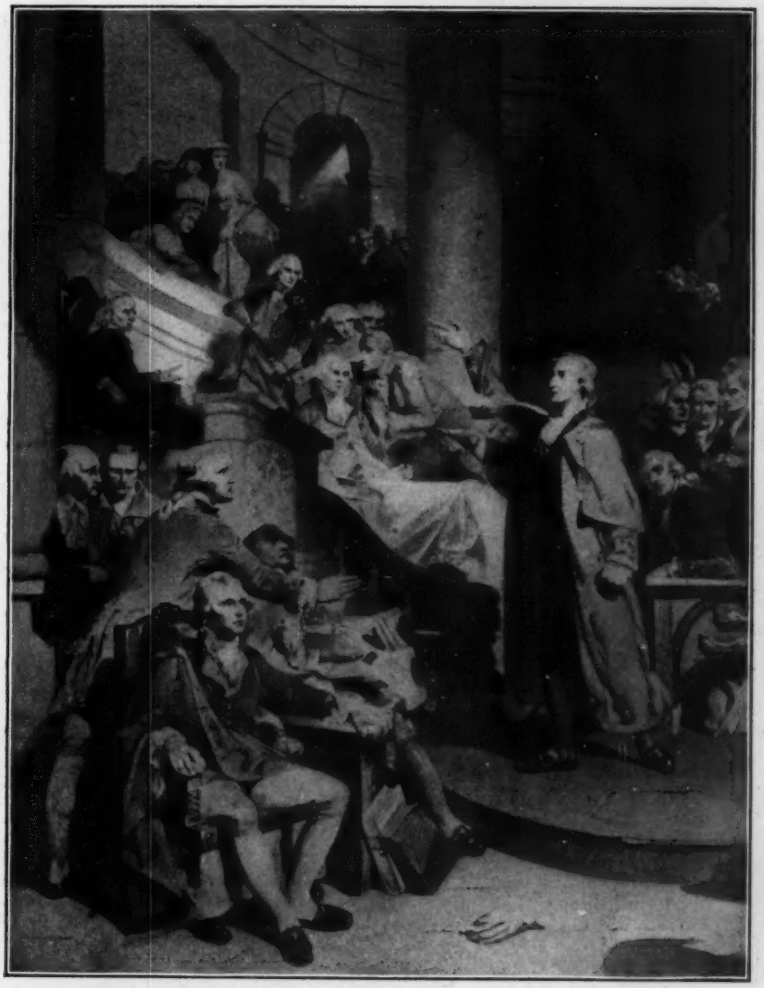

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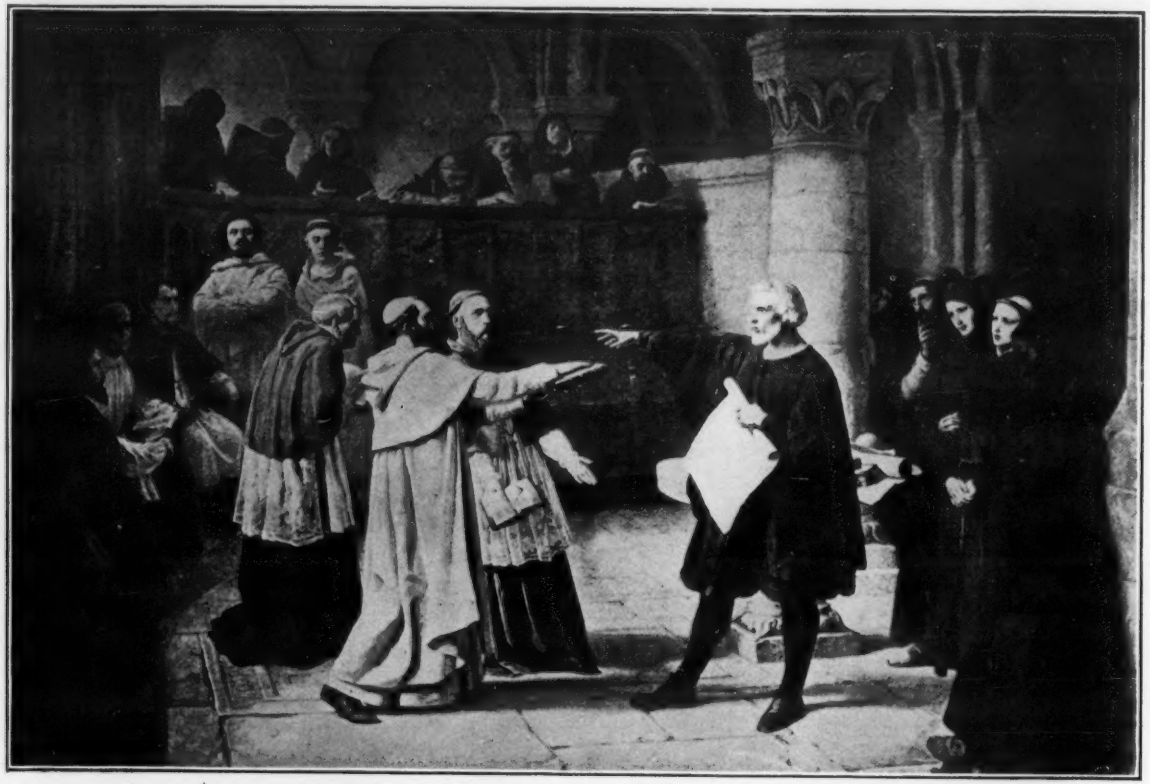

Painting by Roting

COLUMBUS BEFORE THE COUNCIL OF SALAMANCA

THE VOLTA REVIEW

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Volume 16 FEBRUARY, 1914 Number 2

TO BE OR NOT TO BE

A Little Preachment About Deafness

BY EDWARD B. NITCHIE

This article is a close report (slightly abridged) of a lecture delivered to a deaf audience and understood by lip-reading. It was understood very well, too. There is at times much discussion as to whether a lip-reader can understand a lecture. These lectures of mine prove that they can when conditions are right; by "conditions" I mean chiefly a mouth that is not too hard, a good light, a good seat, and an orderly, sequential presentation of the subject.—E. B. N.

"TO BE or not to be" is the title of my lecture this afternoon. I might have called it "What's the use of living after one has become deaf." But that would have sounded pessimistic, and my thought in regard to it is quite the reverse.

If I had not become deaf, I would have been a minister. And so this afternoon I am going to take the liberty of preaching you a sermon, and my theme is: Are we to be something in spite of our deafness, or are we to be—nothing; more than that, are we not, perhaps because of our deafness, to be something bigger, finer, better than had things been otherwise?

When trouble comes upon a man, the way in which he meets it shows not only what manner of man he is, but also what he may become. Trouble is the great revealer of character. To everybody comes trouble, some time, in some way. To some it is deafness, to others blindness, to others illness, to others pain. Many and varied are the forms in which trouble comes. Man is born to trouble, as the sparks fly upward. Some of us have less and others seem to have more than their share. Why? It is the age-old problem. Has it ever been solved? Does any one know? Why does God permit all the evil and suffering in this His world?

Neither I nor any one else can speak with the certainty of knowledge. But this is the way the problem appears to me: I believe in God; I believe in the Over-Soul, the Universal Spirit in which all things live, move, and have their being. I believe that God is always working for the best, and that in His infinite knowledge He uses the tools best adapted to His ends. What seems to us evil may to Him seem good. We do know that out of evil good may come. And I believe that God's purpose is to create that which is good, and that He is ceaselessly working therefor in the wisest way. I do not know why we are deaf, or why others are blind, or why this or that particular trouble is sent to any one. But I do know that the troubles are sent, and that none of us are without them. I do, moreover, know that thousands upon thousands have endured trouble and have triumphed, have been stronger and better and closer to the great heart of God. And I am absolutely sure that the possibility is ours, too, of coming through the fire pure gold. Physical suffering cannot compare with spiritual tor-

ment, nor can physical pleasures compare with spiritual joys. I say I do not know why I am deaf nor why you are, but I do know that being deaf it is still ours to taste of the sweetest joys in God's universe.

THE ATTITUDE TOWARD MISFORTUNE

There are two attitudes for us to take toward misfortune, that of the pessimist and that of the optimist. And yet I do not think any of us take either attitude purely, not at first at least. No matter how hopeless and dispirited we may be, there will in most of us be some fight left. And so long as that is so there is hope. I know the years I went through after I became deaf, and I remember my daily prayers that I might die. And now I count myself among the optimists. I had a call the other day from a woman who had recently become deaf. I had talked with her for some time before I told her I, too, was deaf. "Why," she said, "how can you smile?" But she herself has not stopped fighting; I could see that in the gleam of her eye.

When a man does absolutely "lie down" under misfortune, I confess I do not know what can be done. Such cases, however, are rare, and I am sure that in every one of you there is the fighting spirit, for you would not be here if there were not. We are all either optimists or striving to be. There are two kinds of optimism, and Professor Royce warns us against the "superficial" kind. "Superficial optimism" is the kind that refuses to recognize evil, shuts its eyes to it, and says it is not there. But we are not superficial optimists; we recognize our deafness; we admit it is a cross, a handicap, a misfortune; yes, even a calamity. We do not try to hide it; we try to get the best of it and we believe that we can. That is the only kind of optimism worth having.

MULTIPLYING OUR RESOURCES

The more resources a man has the more successfully will he fight. When we first become deaf, the tendency of most of us is to draw within ourselves, like a snail into its shell; we try to limit our lives within narrow bounds, partly, we think, to save ourselves from mortification, partly to keep from being a nuisance to others. That is wrong. We who are deaf should strive for the broadest life possible. We should remember that we have far more in common with our fellows than not in common. We must emphasize the ties that bind us to others and we must minimize the one cause of separation. We should endeavor to multiply our resources, not to decrease them.

In many of the activities of life deafness is no handicap to our fullest development. This is true physically, intellectually, and spiritually. The more we can broaden in those spheres the more successfully can we fight our battles. Without good health we are tremendously handicapped in our struggle to get the best of deafness. Perhaps from other causes good health may be withheld from us. But we are not prevented by deafness from following the simple laws that promote good health—regular hours, nourishing food, fresh air, windows wide open in the sleeping-room, eight hours' sleep. The health that comes from proper living is a resource we cannot afford to deny ourselves.

A very great resource is to be found in broadening our intellectual horizon. We should each of us have some intellectual hobby, some interest that will at times absorb us to complete forgetfulness of any of the ills of life. Some of us will find it in a love of poetry, and for those who do love poetry there is no other intellectual resource so stimulating and inspiring. But whether it be poetry, or stamp collecting, or woman suffrage we all ought to have some field of knowledge or endeavor which will appeal strongly to us.

THE RELIGIOUS RESOURCE

In the religious life is to be found the greatest resource of all. I do not mean by the religious life simply going to church or teaching Sunday School. I do not myself go very often to church, and

I cannot advise others who are deaf to do so. The strain of trying to hear or read the lips is greater than we have a right to ask. Nor, on the other hand, do I object to church-going for those who love to go for the atmosphere of worship and devotion. My point is only that church-going is not necessary to a religious life, and that deafness is in nowise a handicap to us in living such a life. An honest search for truth, communion, and fellowship with the Over-Soul are still most fully open to us. In nature, in our fellow-men, and in our own souls we can know the divine fellowship; and for all of us who are fighting to get the best of trouble there is no resource so great, so all-sufficient, as a knowledge of God.

Socially the deaf are handicapped—that is, in the rounds and pleasures of a society life. Such a life, however, is not rendered impossible by deafness. One of my pupils, who lives a very active social life, said to me the other day, "If I had not talked myself when I became deaf, I'd have been dropped like that!" making an expressive gesture. If you are a good talker and as good a lip-reader as she is, you can hold your own in society. Grace Ellery Channing advises strongly against the deaf trying to lead a social life; the nervous strain is too great to make it pay. For many people she is right; but denial of society pleasures does not at all mean a denial of the highest social joys. They are to be found in the society of our families and of a few close friends. If deafness shuts us off from such enjoyment, it is our own fault.

But in business life, through no fault of his own, many a deaf man is prevented from his full development. Of all the problems that arise in the lives of those who become deaf in youth or maturity, none is so difficult to solve as that of finding work which will give a truly broad opportunity. It is hard enough for the deaf simply to find a job. "Blessed is he who has found his work," said Carlyle. Too many deaf men and women are denied such blessedness. This is where we need the help and kindness of others.

UNSELFISH SEEKING

To seek the broadest possible life is good, but to seek it selfishly is as futile as for a cat to try to catch its tail. To broaden our horizon for self alone will never give the resources we need to rely on in our struggle for victory. The ideal of service must permeate every sphere and activity of our lives. The monk who seeks the religious life by shutting himself in a monastery, by fastings, flagellations, and prayers is trying to win for self what never can be fully gained save in the devotion of self to others. The Sisters of Charity, the men and women of the Salvation Army, missionaries everywhere, they are the ones who through service are finding the religious life in fullest measure. Service, however, does not mean the forgetfulness of self; it means not to forget others. It means that in whatever we do we should carry the thought of others as well as of ourselves. We are taught to love others *as* we love ourselves—not more. Nor are we taught to love ourselves less, nor yet to despise ourselves. Service, then, is another word for love—loving our own life which God has given us, and loving the lives of all our fellow-men as well. With a broad life so lived no such trouble as deafness can conquer us.

Sidney Lanier has a poem, of which I am very fond, called, "How Love looked for hell." It is an allegory. Love had heard much about hell, but had never seen it, and was very curious to see what it might be like. So first, with Sense as a guide, Love started forth. But everywhere Sense led Love hell vanished before them and there was no hell there. Then Mind tried to lead Love to hell, saying it was in the human heart. But wherever Love went hell was not there.

For hell cannot be where love is. Think what it would mean in this world; think how troubles would vanish from the earth if perfect love were everywhere. Love—the love of our fellow-men and the love of God—with such love in our hearts neither deafness nor blindness, nor suffering nor sorrow, nor any other ill can make hell in our lives, for through such love we can triumph over them.

THE PSYCHOLOGY OF SPEECH-READING

BY JERRY ALBERT PIERCE

"This is hardly more than a brief outline of some of my experiences as a speech-reader of sixteen years' standing, but I hope that it may be of value on account of its treatment of the subject from the deaf man's point of view." Such is the author's characterization of the following article. We wish to express our belief that the results of its publication will justify not only this "hope," but also will serve to emphasize the fact that speech-reading is an attribute and aid, not only of the deaf, but of all who communicate with their fellows by means of speech.

SPEECH-READING, or "lip-reading," as an adjunct to hearing is not well understood. Very few people realize that the sensations they acquire, apparently through the ear, are to a certain extent the result of vision. A conversation between any two individuals is not completely heard; part of it is seen—that is, a man of perfect hearing is a fairly successful speech-reader, even though he be not aware of it. His eyes help him to understand words that his ears have failed to grasp.

With the coming of the moving pictures I have been asked a score of times by "hearing" acquaintances if I were not able to "read" the lips of the actors when they "spoke" on the screen. These friends of mine say to me, "I never imagined for a moment that I could read the lips. Now and then I can catch a word, but I can't understand a whole sentence. What do they say? Do they speak the lines that go with the piece they are acting, or are they merely engaging in an ordinary conversation?" These examples should demonstrate to the hearing the value of speech-reading in their own cases. They cannot "understand a complete sentence," but "catch a word here and there." This occasional word or phrase often and unknown to them represents the difference between a lucid conversation and an unintelligible one.

EYES AS EAR AUXILIARIES

There is still nother illustration. People speaking to each other almost invariably stand face to face. They are reading the lips and are facing each other simply because speech-reading renders the strain on the auditory organs less acute. A person addressing a group turns from one to another for practically the same reason. He instinctively knows that if he were being spoken to it would be much easier for him to understand if the speaker looked at him.

Although there are several other ways of demonstrating the fact that the eyes are auxiliaries of the ears, it is not necessary to go into details. The person who suddenly becomes deaf knows it and so does the boiler-maker or any one who works in a noisy place. Few of them, though, can analyze or even understand the intricacies of the art of speech-reading or, in turn, the dependence of the eye and ear upon the brain to help them out of difficulties. It could in all truth be said that the sense of hearing as applied to conversation has as its seat the ears, the eyes, and that part of the brain which causes one to perceive.

SPEECH-READING IS MIND-READING

Speech-reading in some ways is synonymous with mind-reading. The most successful speech-readers among the deaf are the high-strung, nervous, temperamental people who deduce rather than reason. The poorest lip-readers are the slow, phlegmatic individuals who require a long time to arrive at a conclusion. This is because speech-reading requires the greatest speed possible, an ability to jump at an inference and the power to carry several ideas in one's head at one time. Speech-reading is mind-reading, because a great many other things are necessary than a technical knowledge of the primary motions of the lips and tongue.

The speech-reader does not understand every word spoken to him, just as the hearing man does not hear every word. Sometimes he does not even perceive the whole of one word. He must deduce by placing them all together and grasping from the whole the meaning intended. In the sentence "It is nineteen miles to Omaha and the roads are not good" we have a good example. This comes to the speech-reader's mind as follows: "Itis nty mlestma ndthrodes are not gd." This, in my experience, is the way this sentence "looks" as spoken to me by one who does not know that I am deaf and who is speaking in an ordinary conversational way. I have probably asked how far it is to Omaha, and my mind has arranged itself to receive an answer to this question. It is prepared to be given the number of miles. So far no trouble. I know I am not ninety miles from the city and, therefore, "nty" must mean "nineteen." It could not be "nine" because there was a "t" in that word. I did not catch "Omaha," but that was not needed because it is understood from the rest. I had not asked about the condition of the roads and am momentarily stalled. "Ndthrodes" is a puzzler. I have no time to consider it at the moment and carry it in my head for further deduction. "Are" and "not" are comprehended. "Gd" surely means "good." The speaker pauses at the end of the sentence. I deduce. I have "are not good." "Ndthrodes." Oh! "The roads are not good." All of this is done in the speech-reader's mind during the time the sentence is being spoken and during the very short space of time between this and another sentence. Naturally, it takes quick thinking to do this.

In some ways a short sentence is the easiest to understand and in others the hardest. It is easy because there are fewer words to carry along for further consideration and hard because there are likewise fewer words from which to draw the final inference. I "catch" a word here and there and gather from them the missing words. If the sentence is very brief I am in danger of losing all of the words or of understanding only those which have no vital importance.

TUNING ONE'S "WIRELESS STATION"

Reasoning the meaning of a word by placing it against another is only one of several mental processes used in successful speech-reading. The deaf man studies the speaker before the latter has even opened his mouth. What is his nationality? If a German, a Swede, or a Russian, he will perhaps talk slowly. If a member of a Latin race, look out for speed and spasmodic movements. If, apparently, an American or an Englishman, does he seem phlegmatic or nervous? The speech-reader prepares himself accordingly. Does he appear to be impatient or has he a kindly, tolerant face? Is he educated? Will he use a dialect or the accepted pronunciation of words? Has he a mustache? There are possibly a hundred similar classifications which the speech-reader unconsciously recognizes and brings to his aid. He does not know he is doing it, and the knowledge of the various types of people and their peculiarities come to him only after years of practice. They are necessary to him, but they cannot be taught. It is as if he were a wireless telegraph apparatus tuning himself to recognize waves from another station. He arranges his mind to perceive the sensations which he expects from the individual who is about to speak. If the man, for instance, appears to be but slightly educated, the speech-reader expects simple words, faulty grammar, and some dialect. He is not bringing into play that part of his brain which "holds" his polysyllabic vocabulary. If the speaker gives the impression of being a rapid, excitable one, the deaf man unconsciously tightens his nerves and prepares himself for quick deduction. If the man seems to be a foreigner, the exact nationality, as far as possible, is obtained and the "wireless station" tunes itself for what it expects to receive.

This saves a great deal of time and embarrassment. It is done unconsciously, of course, and a great many deaf people

do not realize that they have this power. It is possessed in a variable degree by all people and is called a "knowledge of human nature."

This understanding of the idiosyncrasies of people when applied to speech-reading is complicated by other peculiarities. A deaf man or woman cannot understand so readily when the speaker is addressing a group. Even if the person talking devotes all of his attention to the deaf man, it is very rarely that the latter can interpret the conversation with half the ease that is possible when he is the sole audience. This has been explained in many ways. Some assert that it is due to the speaker's habit of turning his face from one auditor to another, thus presenting for a moment a direct view of the mouth, then a semi-profile, and finally a full profile. Others believe that self-consciousness on the part of the deaf man in the presence of outsiders prevents the necessary mental concentration. The writer thinks that there is truth in both of these theories, but that the chief cause of this is the fact that the nerves of the deaf individual unconsciously relax through a lessened sense of personal responsibility.

EFFECTS OF BRAIN FATIGUE

Speech-reading calls for strong nerves and the power of exerting them into intense action. The reader labors under a strain almost as acute as that of an athlete preparing to sprint. Naturally, the reaction is fatigue in an extreme form and a long, uninterrupted session of speech-reading dulls the perceptive powers of the deaf man until finally little at all can be understood. The theory that speech-reading is mind-reading is still nearer its proof when this is considered. The deaf man can see the lips just as readily when tired as he can when refreshed, but he is unable to bring into action his ability to deduce. His brain is wearied and refuses to work. The fact that expert speech-readers are, without exception, nervous people still further demonstrates this.

It must not be gathered from the above, however, that speech-reading is an extremely difficult art. It is not. It is an acquired art and is learned and practiced unconsciously. The peculiarities I have mentioned and the preliminary "sizing up" of the speaker are done in a very small fraction of a second and are quite unconscious actions. The brain has a remarkable recuperative power, and fatigue to the point of incomprehensibility is very rarely felt. Pauses between sentences, the time used in making explanatory gestures, laughter, and the like give the speech-reader plenty of opportunities to calm his nerves. The reader himself may say something, and in addition to giving himself time to rest can force the conversation into channels more readily comprehended.

A SPEECH-READING DRUGGIST

The writer is acquainted with a deaf druggist who takes pride in the fact that he can wait on his customers as easily as can his clerks. He thinks drugs and the other articles found in his store. He has his vocabulary of drug terms on the surface of his brain, as it were, and when a customer asks for something he can easily grasp the meaning. He does not think of eggs, butter, shoes, hammers, or automobile accessories, and does not have such a large vocabulary to carry as would be the case if he did. He naturally expects his customers to ask for things found in a drug store and is prepared. This often results in interesting complications. People sometimes have peculiar ideas in regard to what a druggist should keep in stock, and they ask for things which this deaf druggist is not able always to understand.

Speech-reading, however, is far from being "guesswork." Hearing is not entirely infallible itself. It is quite easy for a normal person to find a speaker incomprehensible through the misu ler-standing of one or two vital words, speech-reading, therefore, should no condemned for having a similar f Its greatest weakness is the difficult understanding proper nouns, but eve normal man usually has some trou

when being told a man's name for the first time.

HEARING VISUAL SPEECH

Speech and speech-reading have still other points of resemblance. It is hard to tell exactly what sensations occur when the speech-reader is congenitally deaf and has thus never heard the sound of the human voice. To a deaf man who has not always been so and who still retains a memory of sound variations and tones the effect is interesting. Speech-reading to him is hearing, and each word interpreted by him is received and recorded just as it would be on the normal ear. For instance, the word "boy" is not just a series of facial motions, but actual *sound*. He *hears* that word. Those phrases or words which he does not interpret at first and which he puts aside for future deduction are even themselves sounds, but so confused that he cannot at first recognize them. The expert speech-reader of this type really knows what sounds are. His life is not a quiet one because speech-reading to him is noise. Whenever he understands visual speech he hears it. Such a person even claims that he can tell what kind of voice a certain individual has. He can distinguish a shrill treble from a heavy bass by the motions of the lips and can even identify less prominent variations. This is due in part to his past recollection of the tone issuing from certain types of people and partly to instinct and reason. It is natural for him not to expect a squeaky voice from a big man or a bass tone from a child. Guided by these general rules, perhaps he makes a mental image of what the sound should be and "hears" it accordingly. This sensation, very likely, is not universal among the speech-reading deaf, but is merely the possession of those who have heard and remember the sound of the human voice. I have asked several of the congenitally deaf in regard to this, but none of them are able to describe very graphically the sensations they experience.

The phenomena of speech-reading are interesting. The deaf man is constantly discovering something new and is often at a loss to explain it. It is a field rich in possibilities to the psychologist and deserves more attention than it receives.

LIP-READING LYRICS—Number One

Mary had two little ears,
That could not hear a sound;
They went with her where'er she went,
She had them always round.

They bothered her an awful lot,
Especially at school;
The teacher called her "little dunce,"
The children called her "fool."

She failed in lessons every day,
Her thoughts would often roam;
"You stupid child," the teacher cried,
And sent poor Mary home.

But Mary learned to read the lips,
And then went back to school;
She took first place in every class,
She knew her every rule.

"What makes our Mary now so wise?"
The eager children cry.
"Oh, Mary hears now with her eyes,"
The teacher did reply.

And you, good friends, who may be deaf,
Will find a friend in need,
If you will do as Mary did,
And learn the lips to read.

EDWARD B. NITCHIE.

AN OUTLINE IN ARITHMETIC AND METHODS OF PRESENTING THE SUBJECT*

BY BARTON SENSENIG

IN THE beginning the deaf child is not so greatly handicapped in the study of arithmetic as in the acquisition of language. The hearing child, as a rule, starts his school work at the age of five or six with practically no knowledge of numbers, but with a large vocabulary of well-understood words. One would think that the hearing child would have acquired a knowledge of numbers just as he did of words, but *five* represents about the limit of his experience in number work. He knows that hundreds and thousands are many, but his ideas lack definition, and arithmetic is a science which deals with definite results.

The course we outlined for the first year in arithmetic is not much shorter than that which is covered in schools for the hearing. Our work in the first grade is based almost entirely on observation, and, as a result, the deaf child is not at a great disadvantage. Arithmetic will not be mastered by the hearing child without trying. He will not acquire it as easily as he acquired language. Deaf children, being taught in small groups and by teachers who adapt the work to their limitations, will make satisfactory progress. Teachers of hearing children are apt to take too much for granted in the case of dull children. Teachers of the deaf, realizing the magnitude of the task before them, constantly illustrate by means of objects, by drawing, and by acting out the ideas they wish to impress, and by so doing manage to cover about as much latitude as those teaching the hearing.

THE SECOND YEAR'S WORK

In the second year we propose to extend the reading and writing of numbers to 1,000. We shall proceed as in the first year, having at least several bundles of a thousand sticks each, one of which should be made up of ten hundred-bundles, to be used in subtraction work. In connection with numeration and notation, we shall introduce the exercise of analyzing numbers as to their meanings. What does 256 mean? Speak the number slowly—200, 50, 6. Have the children illustrate with sticks. Add 200, 50, and 6 to obtain 256. Require the children to illustrate the meanings of any numbers the teacher may select.

EIGHTEEN AS A LIMIT

In this grade we extend the ten limit to eighteen for addition and subtraction.

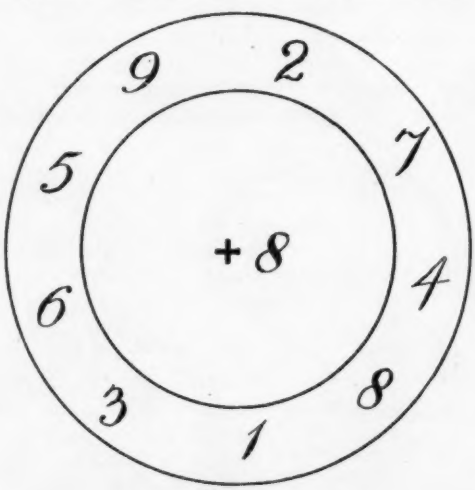

FIG. 1

The numbers expressed by any two digits will not make a sum greater than eighteen, and in subtraction the minuend is never greater than eighteen for any single case of subtraction. $9+9=18$ is the highest combination we have in addition and $18-9$ is the highest in subtraction. In subtracting 9 from 38, we take 9 from 18 and write two tens. In adding 9 to 67,

*This is the second of a series of articles by Mr. Sensenig. An outline of the first year's work appeared in the January issue of this magazine.

we add 9 to 7 and write seven tens. To promote speed in addition, we make use of a number-circle (Fig. 1). Arrange the numbers from one to nine in a circle, with the number to be added at the center. Point from one figure to another and have the pupils announce the sums. Vary the exercises by placing other digits in the center. Have the pupils choose sides and see which side can finish a required number of combinations in the least time. The game will be interesting and the attention close. This method is psychologically correct. There is no necessity for having objects in mind when adding, and the ability to make rapid combinations is very desirable.

In all the realm of addition there are only forty-five cases, twenty-five of which have been mastered in the first grade. The following cases remain:

2+9=	4+9=	5+9=	6+9=	8+8=
3+8=	5+6=	6+6=	7+7=	8+9=
3+9=	5+7=	6+7=	7+8=	9+9=
4+8=	5+8=	6+8=	7+9=	

Seven and nine is the same as nine and seven. We assume that the child has grasped this relationship when we state that there are only forty-five cases in addition. The above combinations will appear in a variety of problems. In order to impress on the child's mind that nine and six always bring a five, let us submit problems as follows:

9+6=	39+6=	69+6=
19+6=	49+6=	79+6=
29+6=	59+6=	89+6=

Call attention to the fact that the sum always lies in the next order of tens if the two figures added make a sum greater than ten. If the child grasps the idea, it will be just as easy for him to add 8 to 38 as to add 8 to 8.

Other groups may be submitted as follows:

7+6=	8+5=	9+5=	6+8=
17+6=	18+5=	19+5=	16+8=
27+6=	28+5=	29+5=	26+8=
etc.	etc.	etc.	etc.

9+9=	7+7=	8+4=
19+9=	17+7=	18+4=
29+9=	27+7=	28+4=
etc.	etc.	etc.

These suggestions will lead to other combinations covering all of the above cases. A chart with the forty-five cases of addition should be in the hands of the teacher and should be used in rapid combination work.

SUBTRACTION

In all the realm of subtraction there are ninety cases, fifty-four of which fall within the ten limit, and have already been taught in the first year's work. That leaves thirty-six cases, which are as follows:

18−9=	17−8=	16−7=	15−6=
17−9=	16−8=	15−7=	14−6=
16−9=	15−8=	14−7=	13−6=
15−9=	14−8=	13−7=	12−6=
14−9=	13−8=	12−7=	11−6=
13−9=	12−8=	11−7=	
12−9=	11−8=		
11−9=			

14−5=	13−4=	12−3=	11−2=
13−5=	12−4=	11−3=	
12−5=	11−4=		
11−5=			

The following groups illustrate in what ways some of the above combinations within the hundred limit may appear:

18−9=	17−8=
28−9=	27−8=
38−9=	37−8=
48−9=	47−8=
58−9=	57−8=
68−9=	67−8=
78−9=	77−8=
88−9=	87−8=
98−9=	97−8=

This scheme carried out for each of the above cases would cover 324 problems within the hundred limit when borrowing is involved and when the minuend in each case is greater than ten. Within the ten limit there would be 486 problems, making a total of 810 problems within the hundred limit and thousands of problems beyond that limit; so the pupil who masters the ninety cases is endued with power.

The attention of the pupils should be called to the similar groups. The results in the units' columns for each group are the same. The grouping of the problems as above will help the pupils to remember

the various cases. It also gives the pupils a wider outlook.

The teacher should be in possession of a chart with the ninety cases of subtraction, to be used in rapid reviews.

GRADING DIFFICULTIES

In our combination work we have been doing problems of two figures. A problem of three or more figures should not present much more difficulty. The order of procedure is to give problems involving no carrying at first and then with carrying. With the knowledge of the structure of number we have put in possession of the pupils, they should find no difficulty in carrying. Have the pupils add some quite large problems containing three or four numbers of two and three digits each. They feel that they have done something worth while when they have done one correctly.

The order of increasing difficulty may be represented as follows:

$$\begin{array}{rrrrrr} 3 & 25 & 322 & 89 & 45 & 235 \\ +4 & +43 & +136 & +7 & +76 & +128 \\ \hline \end{array}$$

$$\begin{array}{rrrr} 468 & 765 & 86 & 246 \\ +395 & +248 & 75 & 782 \\ \hline & & +36 & +209 \\ & & \hline & \end{array}$$

Teach the pupils how to add. In the problem $6+2+7+9$ the pupil should be taught to think *eight*, then *fifteen*, then *twenty-four*. In the last thought nine was combined with five to make fourteen and the sum was raised from teens to twenties.

In subtraction use numbers of one, two, and three figures each, beginning with the simpler forms in which no borrowing is involved. The order of increasing difficulty may be represented as follows:

$$\begin{array}{rrrrrr} 6 & 38 & 465 & 82 & 34 & 253 \\ -4 & -21 & -132 & -7 & -26 & -138 \\ \hline \end{array}$$

$$\begin{array}{rrr} 212 & 306 & 4005 \\ -89 & -128 & -2846 \\ \hline & & \end{array}$$

In the eighth problem borrow one from 30; cross out 30 and write 29 above it. In the ninth problem borrow one from 400; cross out 400 and write 399 above it.

Though some large numbers are used to illustrate borrowing, most operations in this grade are confined to small numbers.

MULTIPLICATION

The multiplication idea was developed in the first year's work. In this grade we want to master the ten, two, five, three, and four tables in the order given. In connection with first-grade work the ten-table was almost completed. It may be shown that a number of tens is equal to the number with a cipher written after it. So, in multiplying by ten, the products may be written immediately. The two-table is very important in addition work. The pupils have little trouble with $8+8$, $8+7$, and $8+9$ if rightly taught; $8+7$ is one less and $8+9$ is one more than $8+8$. I asked a hearing boy, "How much is $8+7$?" He answered almost immediately, "15." I said, "How do you know it?" He said, "Two eights are sixteen and 8 and 7 is one less." Thus it is seen that by the help of the two-table most of the harder additive combinations are easily mastered. Do not depend too much on repetition, as that alone has a bad effect on the mind. It is better for the pupils to think a little than to learn by rote. It is also better to come to conclusions in this way than by counting fingers or strokes. By the end of the year we expect pupils to name results from memory.

Call attention to the fact that $3\times 2 = 2\times 3$. In this way the difficulty of the multiplication tables is made but half as great as it is when this point is not made clear.

In giving multiplication problems the order of increasing difficulty for this grade may be represented as follows:

$$\begin{array}{rrrrrrr} 3 & 8 & 24 & 122 & 46 & 138 & 397 \\ \times 2 & \times 4 & \times 2 & \times 4 & \times 5 & \times 3 & \times 4 \\ \hline \end{array}$$

Problems in multiplication involving small numbers will be the rule in this grade, and the multiplier will consist of one digit only.

To develop speed a circle like the one employed in addition may be used by changing the plus sign to times and by having the scale of numbers run from one to twelve.

DIVISION

Division is the converse of multiplication. It consists in resolving a number into equal groups. In this grade we shall use the products obtained in the multiplication tables as dividends and the divisors will be the factors used in obtaining the products, so there will be no remainders. Do not push the group idea too far; rather refer back to multiplication to find how many times one number is contained in another, or else the pupils may continue to use a long way and not master the tables.

Some time ago I found a pupil who was not sure of her tables adding the divisor to itself a number of times to find how many times it went into the dividend. The pupil proceeded with a full knowledge of the meaning of division, but finished her problem long after the others had completed their work. The tables should be mastered, but not in order.

For rapid work use number circles with products arranged about a factor as follows:

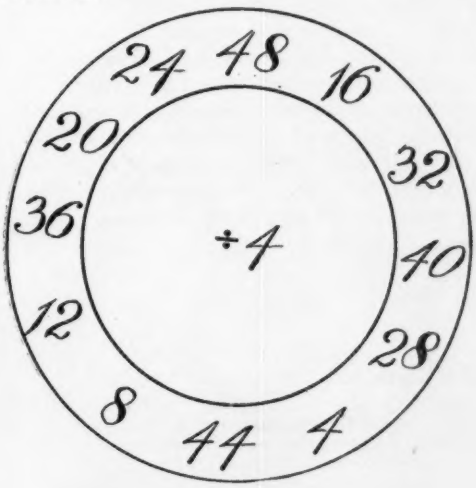

FIG. 2

The teacher points from one number to another, having pupils name the quotients. In this grade the divisors will be 2, 3, 4, 5, and 10, and the dividends will be exact multiples of these numbers.

MEASUREMENTS

Denominate number tables should be built up from actual observation and use of the units of measure. By the end of the year the children should be familiar with the following facts:

10 ones = ten (10).
10 tens = a hundred (100).
10 hundreds = a thousand (1,000).

60 seconds = 1 minute.
60 minutes = 1 hour.
24 hours = 1 day.
7 days = 1 week.
12 months = 1 year.
100 years = 1 century.

12 inches = 1 foot (ft.).
3 feet = 1 yard (yd.).

2 pints = 1 quart (qt.).

12 things = 1 dozen.

They should also know the value in cents of a nickel, a dime, a quarter, a half dollar, and a dollar.

In connection with the table of time the names of the days of the week and the months of the year are taught in order. Roman notation should be taught to twelve for clock use.

Problems on the above tables, as well as all problems for this grade, should involve only one operation. Money should not be written with a decimal point in this grade.

Much measuring should be done with the foot-rule and the yard-stick, the pint and the quart. The dimensions of the school-room expressed in feet should be obtained. Compare the heights and ages of pupils, bringing into use the expressions for the comparative degree, *more than, higher than, taller than, older than, younger than.*

In building up the table on time interest will center about the clock. A clock face with an hour and a minute hand may be made out of heavy cardboard. The pupils should first learn time by hours; then *half past, quarter past,* and *quarter of* should be taught. Count by fives to the right of twelve to find time

between the hour and half past and count in the same manner to the left of twelve to find time between the half hour and the next hour.

Play "keeping store," using paper money, but also show real equivalents. Develop the meaning of the terms *buy, pay, sell, get change.*

TYPICAL PROBLEMS

Type problems for this grade would include questions like the following:

(1) How many inches in four feet? (2) How many yards in 36 feet? (3) John is 42 inches tall; Harry is 46 inches tall. How much taller is Harry than John? (4) How many cents in four dimes? (5) How many dimes in 50 cents?

(6) How many eggs in 4 dozen? (7) How many months in 3 years? (8) How many minutes in five hours? (9) How many hours in 2 days? (10) Mary bought a toy for 15 cents and gave the clerk a quarter. How much change did she get?

(11) How many cents in a quarter, a dime, and a nickel? (12) How many units (ones) in a thousand, a hundred, a ten, and six? (13) How many feet around the room? (14) How many weeks in 35 days? (15) How many feet in 27 yards?

(16) Mary had 50 cents and spent 27 cents. How many cents had she left? (17) John bought a top for 10 cents, an orange for 5 cents, a doll for 50 cents, and a toy for 15 cents. How much money did he spend? (18) I bought goods for 76 cents and gave the clerk a dollar. How much change did I receive? (19) Name the days of the week in order, beginning with Sunday. (20) Name the months of the year in order, beginning with January.

(21) In an orchard there are five rows of trees, with 24 trees in each row. How many trees are there? (22) A boy had 10 cents and wanted to buy a box of candy for 15 cents. Did the clerk give him the candy? (23) $24 - 36 =$ what? (24) If melons are worth 20 cents each, how many can I buy for 10 cents? (25) If the hour hand of the clock points to 3 and the minute hand points to 12, what time is it?

Problems involving smaller numbers will illustrate most of the above principles and may be done without pencil and paper. The work must be varied. Constant speech-reading is too great a strain. The children should be given a chance to *do* things during each recitation. They should not be required to sit all the time. I think one great reason why children delight in the arithmetic period is because a part of the time is usually spent in putting problems on the board. The idea that pupils are only in order when they are seated is erroneous. It is injurious to the health of young children to be required to sit throughout an entire recitation. The children should be required to illustrate the work and the teacher should set the pace in the matter. I think the greatest pedagogical error consists in a lack of illustration and in putting too much emphasis on repetition. Not so much repetition is needed when children have the proper ideas.

NOTE.—*In the next issue Mr. Sensenig will outline the work of the third year.*

LIMERICKED LIP-READERS

Said a lady who heard with her eyes,
"Eavesdroppers I really despise."
But friends always made sure
That the light was quite poor
When they planned to give her a surprise.

A yachtsman who sailed o'er the bay,
Took a lip-reading miss out one day.
Of "luffing" he talked,
But at "loving" she balked,
And homophenously came the fray.

PRINCIPLES OF SPEECH AND DICTIONARY OF SOUNDS

Including Directions and Exercises for the Cure of Stammering and Correction of All Faults of Articulation.

BY ALEXANDER MELVILLE BELL

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The fifth edition of "Principles of Speech" having become exhausted and a large demand for additional copies having arisen, it has been decided to republish the work in the pages of THE VOLTA REVIEW. *The first installment therefore appears in this issue, and additional portions of the work will be found in each succeeding number until completed. Such additions and corrections from the last edition as may be deemed necessary will be made under the personal supervision of Dr. Alexander Graham Bell, the son of the author and his successor in the work for which Alexander Melville Bell is justly famed.*

EXTRACTS FROM PREFACES TO PREVIOUS EDITIONS

IN PREPARATION of this work the author has endeavored to write, not as for the use of pupils, to whom a defective description in the book might be orally supplemented, but for those to whom such additional instruction is not, and cannot be, available. He has studied to observe the utmost simplicity of arrangement and to avoid overloading principles by unnecessary rules. He has not followed in the steps of any preceding writer, either as to his theory or his plan of developing it; but he has observed nature for himself and recorded his observations after his own fashion. THE SCIENCE OF SPEECH SEEMED TO WANT AN A B C, AND HE HAS ENDEAVORED TO SUPPLY THE DEFICIENCY.

With reference to defects and impediments of articulation, the author has unreservedly communicated the principles and exercises by means of which such faults may be eradicated; and by the persevering application of which the stammerer, to whom oral instruction is beyond convenience, may work out his own relief.

Early attention to imperfection of utterance would be in almost all cases successful in preventing the formation of impediments, if parents, teachers, governesses, and tutors were competent to direct the articulation of children. The necessary knowledge of principles, with many assistant exercises, adapted for the youngest pupils, the following pages supply.

Public speakers, whose pronunciation is indistinct, or who suffer from exhaustion after vocal effort, will here learn the means of rendering their delivery mechanically faultless and the most protracted exercise of the voice perfectly easy and salutary.

Students of language will find the elementary analyses of the vowels and articulations, the illustrative tables, observations, etc., and the articulative exercises, of great value in facilitating the acquisition of foreign tongues, and the perfection of vernacular utterance; while to foreigners the attainment of English characteristics of speech is, by the same means, rendered easy of accomplishment.

The subject of visible speech, introduced for the first time in the fifth edition as a completing section of the book, cannot fail to be of important assistance to the student in mastering the "Principles of Speech" for teaching purposes.

I rejoice that this book has been found worthy of so long a life. Through it I may hope to continue teaching—as hitherto—successions of students in Britain, America, and wherever English is vernacular.

ALEXANDER MELVILLE BELL.

PART FIRST

VOCAL PHYSIOLOGY, THE PRINCIPLES OF SPEECH, ETC.

THE ELEMENTS OF SPEECH.

SPEECH consists of variously modified emissions of breath. The first modifying agent is the glottis, or aperture of the wind-pipe; in passing through which, the breath acquires a rustling, vibratory, or sonorous quality, in proportion to the degree of tension and approximation of the vocal chords—the edges of the glottis.

When the glottis and the mouth are *perfectly open*, the breath may be expelled, even forcibly, without audibility. When the glottal aperture is *somewhat contracted*, the passage of the breath is rendered faintly audible; this is the condition of the glottis in whispering a vowel, or in the softer utterance of the letter H. The glottis may be adjusted *almost to the vocalizing position*, and that husky voice is produced which is the natural expression of fear and of the dark passions; and when the edges of the glottis are braced to the *clearly vocalizing point*, the breath acquires that beautiful sonorous quality which is called VOICE.

The breath, glottally modified in either of these ways, may be farther modified in its passage through the mouth, by the shape and arrangement of the plastic organs of articulation—the soft palate, the tongue, and the lips.

The varying shape of the mouth, with an uninterrupted central channel for the issue of the breath, gives *vowel* quality to the breath, whispered or vocalized; and the close approximation, partial or complete contact of the oral organs, gives *articulative* or "consonant" effect to the same voiceless or sonorous current of breath.

In the common analysis of Speech, its elements have been divided into two classes, called *Vowels* and *Consonants*. The former class is said to contain those elementary sounds which are capable of being uttered alone; and the latter, those which are incapable of being pronounced without the aid of a vowel. This is incorrect; for, not only the vowels, but all the "consonants," may be perfectly sounded alone. The terms Vowel and Consonant, thus understood, do not draw a clear line of distinction between the two natural classes of elements, intended to be designated; and either some other nomenclature must be adopted, or a definition of these terms received which may effect the object of the classification. The ordinary definition of the term *Vowel* would render that name equally applicable to all the elements of speech; and the term *Consonant*, as generally defined, is inapplicable to any one of them.

To remedy the inconvenience of inaccurate definitions, numerous subdivisions of the elements have been made, and categorical terms have been multiplied. As might be expected from such a fundamental error, writers are often not agreed as to the class to which certain letters should belong. Y and W have been by some authors declared to be consonants; by others, vowels; by others, semi-consonants; by others, both vowels and consonants. It will be of importance if we can establish a classification which may be generally admitted.

Dr. Rush, in his "Philosophy of the Human Voice," has proposed a mode of classification into "tonics" (vowels), "subtonics" (articulations with voice), and "atonics" (voiceless articulations). But this does not show the primary and most important division of the elements, intended to be expressed by the terms, Vowel and Consonant. It does not recognize the difference between a *position* and an *action*, which this acute author seems strangely to have overlooked.

"Consonants" have been subdivided into *mutes, semi-mutes, semi-vowels, demi-semi-vowels, liquids, sharp letters, flat letters, soft, hard, etc.;* but to most of the terms there has been no clear meaning attached, and in their application there has been no little inconsistency. The names *flat* and *sharp, hard* and *soft,* etc., have been applied by different persons to opposite classes of letters; and,—so little have these words been made to convey any definite idea,—we have heard the two former terms explained by a public lecturer to be "just like sharps and flats in music," to which, except in an absurd nomenclature, they have not a shadow of relation.

The most obvious difference among the elements of speech obtains between those sounds which pass freely through the *open* mouth, and those which are forced through *interstices,* or stopped by organic *conjunction.* The former may as well be called *vowels* as by any other name; only let the term be correctly defined, and the mere name is of little consequence. Those utterances, then, which pass freely from the glottis through a certain open conformation of the vocal canal, and unaffected by any sound of breath, hissing, or compressed within the mouth,—let us call VOWELS. All other elements of speech will be found to coincide in this, that their audible effect is either wholly or partly produced within the mouth; and that an appulsive action of some part of the lips or tongue is necessary to their formation. Let us call these by a term already in use,—ARTICULATIONS.* A vowel, according to this definition, is the result of an open *position* of the oral organs; an articulation is the result of an opening *action* of the organs.

The Articulations are, on obvious principles, divisible into subordinate classes. Some of them owe their audibility solely to the mouth, to the action of the breath against the organs of articulation. As these are accompanied by no glottal vibration, they may be appropriately called Voiceless or *Breath* articulations. All others will fall under the category of *Voice* articulations.

The nature of the articulative *actions* gives reason for subdivisions of each of these classes. Those actions which altogether stop the flow of breath or voice may be called *obstructive,* or *shut;* and those which do not, may be appropriately called *continuous;* the latter being further divided into *close* and *open.*

Thus, the letters P, T, K are shut breath articulations; and B, D, G, are shut voice articulations; F, Wh, Th, S, Sh are continuous breath articulations, and V, W, Th, Z, Zh, R, Y, L, M, N, NG are continuous voice articulations. Of these last, the first seven letters are *close,* and the remainder *open.* The reason for making a distinction among the continuous voice articulations is that L, M, N, NG are almost as purely vocal as any vowel—the stream of voice having a free channel, and suffering but little compression in its passage. Indeed, but for the distinct organic *action* necessary to each of these letters, they might be ranked among the vowels.

Our alphabet gives us 26 letters;—5 vowel, and 21 articulation marks. Our language contains 13 radically distinct *vowel* formations, and 24 varieties of *articulation,* besides the variable aspiration H. A *perfect* alphabet of English sounds would therefore contain not fewer than 38 distinguishable simple characters. But, on a principle which will be found explained in a subsequent chapter, this number might be obtained from little more than 12 distinct characters,—the remainder being produced from these by uniform changes, to represent their uniformity of difference.

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* The word "articulation" has been sometimes applied to vowels, as well as consonants, but its limitation to the latter class of elements is not only convenient, but correct. The vowels are the material of speech, and the articulations are the joints or hinges by whose motion the vowels are separated from each other, and are affected in their duration.

Not only is the alphabet deficient in the number of its characters; it is also redundant, and is burdened with letters which do not represent simple elements, but combinations. The inadequacy of the vowel marks to represent the vowel sounds is most manifest. We have no regular and consistent way of writing any one vowel. Single letters represent diphthongs, and the utmost confusion of diphthongal characters prevails in our modes of writing simple vowel sounds. The alphabet furnishes no characters by which to represent six of our articulations—namely, Sh, Th(in), Th(is), Zh (as in azure), Wh, NG; and we are thus forced to the anomaly of using digraphs to represent simple sounds, while there are simple characters in the alphabet which represent double sounds; we have three letters for one articulation, namely, C, K, Q (besides which we compound a digraph, Ch: the letter C stands for both K and S; and the letters J and X represent combinations of two actions; the former letter being equivalent to *d zh*, and the latter,—doing quadruple duty,—representing *k s*, and also (their voice forms) *g z*.

The great inconvenience of this faulty alphabet has been long felt; and however easy it might be to propose a remedy, it would not be so easy to get the most advantageous plan adopted. We must content ourselves, in the meantime, with clearing away the difficulties that have arisen from the want of a correct and generally recognized principiation of our speech, and leave the reformation of our orthography to be worked by a more thorough acquaintance with its defects. We shall have aided the work if we succeed in classifying the elementary sounds according to their natural order, and in describing popularly and practically the exact formation of the elements of speech.

BREATH—RESPIRATION.

The importance of knowing how to regulate the breathing with ease and efficiency, in public speaking, cannot be over-estimated. Many a zealous speaker has cut short his career of usefulness by injurious action of the chest in respiration; and complaints are frequent—especially among clergymen—of uneasiness in speaking, exhaustion after vocal effort, pain in the chest, expectoration of blood, and other symptoms of serious pulmonary affections, which manifest the prevalence of fatal ignorance on this most important subject.

Here is one momentous evil arising from the neglect of vocal training, as a part of the necessary education of clergymen. Proceeding to the performance of arduous public duties with the mere *instinct* of speech, many sink under the injuries inflicted by zealous but misdirected effort. For want of a principle of managing the respiration, which should have been acquired before the delivery of their first sermon, they accompany every accent by a motion of the trunk or the limbs; and, with chests almost collapsed, work themselves into vehemence by dint of sheer bodily labor. To avoid feebleness and monotony, they must be constantly in action—tossing and swaying the body—rising and falling on the heels—nodding the head—swinging and jerking the arms—kneading the cushion—or hammering on the pulpit frame. Some, with little taste or tact, fall into a regular rotation of actions, which they perform as uniformly as automata; and others, gratifying their sense of the necessity for variety, yield to every impulse, and indulge in the most out-of-place extravagance; under which they steam, and drip, and froth; while the strained, ranting sound which is squeezed or spouted forth exhausts the powers of nature, and the overwrought speaker, panting and breathless, sinks into a state of complete prostration.

The amount of air ordinarily inspired for *vital* wants is quite insufficient for *vocal* purposes. The lungs must, before speech is commenced, and during speech, be made to contain a far greater than the ordinary supply. For breath, let it be remembered, is the *material* of speech.

To make the speaker's respiration healthful, the act of inspiration must be full and deep. No effort of *suction* is required to effect this; the chest has but to be expanded, and the air will rush into the lungs, and distend them to the full extent of the cavity created within the thorax. The chest *must then be held up,* to prevent wasteful emission before speech is commenced; and, during the longest flow of speech, the chest should fall but little. The upward pressure of the diaphragm on the lungs will expel the breath without the laborious action of the bony structure of the chest.

No straining or muscular effort is needed to elevate, or to keep raised, the framework of the chest; the wave of breath inspired should, as it were, *buoy it up,* and frequent replenishings should keep it thus afloat on the body of air in the lungs.

The breathing should always be conducted *inaudibly;* an inspiration, to be full, *must be silent.* Noisy inspirations are necessarily incomplete; their sound arises from constriction of the glottal aperture, and this, of course, lessens the volume of air that can enter. But even were such breathing as effectual as the noiseless flowing in of *a wave of air,* the hideous effect of it would be enough to keep every speaker of taste from so outraging the feelings of his auditors. This sort of strangulatory inspiration is most common on the stage, among the melodramatic heroes, whose element and forte are "colored fire" and "desperate combats."

The common Scotch bagpipe gives an excellent illustration of the comparative efficacy of a partial and of a complete inflation of the lungs. See the piper, when the bag is only half filled, tuning the long drones; how his arm jerks on the windbag!—and hear the harsh, uneven notes that come jolting out from the pressure. Then see him, when the sheep-skin is firmly swelled beneath his arm—how gently his elbow works upon it! while the clear notes ring out with ear-splitting emphasis. Let the public speaker learn from this an important lesson. He, too, plays upon an instrument—one not unlike the bagpipe in construction. Let him learn to use it rationally; in consciousness, at least, of the mechanical principles of the apparatus. For, as the instrument of speech is more perfect than anything the hand of man has fashioned, it surely must, when properly handled, be "easier to be played on than a pipe!"

A very useful exercise for strengthening the respiration consists in *reading* in a *strong, loud* WHISPER. This will be found laborious at first, but practice will make it more easy. It should not, however, be long continued, on account of the giddiness which it is apt to produce.

A full *inspiration* elevates and expands the chest, and, by descent of the diaphragm, slightly protrudes the abdomen; and a correct *vocal expiration* manifests itself, first, in the flattening of the abdomen, and then in its very gradually falling inward, in prolonged expiration:—the *chest* making little or no *action* downwards, even in the most forcible effort.

In cases of pulmonary and vocal weakness, the very opposite of this mode of respiration is generally found to be habitual. The chest falls with every expiration, and has to be again raised when breath is inhaled. The diaphragm is almost a fixture, and the speaker becomes exhausted by the continual muscular effort needed to work the massive framework of the chest. The chest should be fully expanded, once for all, before the first word is uttered, and then kept up by frequent imperceptible replenishments of air, to the close of the longest sentence or

paragraph. In this way, speaking becomes, instead of an exhausting labor, one of the most salutary exercises.

Comparatively few persons ever have the chest fully inflated—except, perhaps, before a yawn or a sigh;—and many undoubtedly sink into consumption from the continual state of collapse in which the lungs are kept. Mechanical exercises in breathing to develop the chest would be of more avail in the cure of consumption than change of climate or all the drugs in the pharmacopœia.

Stammerers almost always have the clavicular and unhealthy respiration above described. The action of the chest is sometimes painfully laborious; and the natural emission of the breath in speech is checked by spasmodic closures of the mouth and glottis; or reversed by attempts to speak with ingoing air. The regulation of the breathing is the most important, and, generally, the most difficult part of the process of cure.

VOICE.

The organ of Voice is placed beyond the reach of observation in the living subject, and consequently has seldom been seen in operation. Circumstances have, however, enabled some qualified observers to see enough of its modes of action to ascertain analogies between it and certain musical instruments. The vocal organ combines the qualities of a wind and of a stringed instrument, sound being produced by means of a current of air—as in the flute; and alterations of pitch being effected by elongation and contraction, with comparative slackness or tension of the vocal chords—as in the violin. All other instruments of sound, however perfect in their kind, fall infinitely short of the compact perfection of this wonderful apparatus; which, within such a tiny space as mocks the art of man, unites the various registers, and the swell and thunder of the organ, with the flexibility and minute play of tone of the violin or Eolian harp.

Some important vocal principles may be illustrated by means of a simple little instrument, whose sonorous vibrations are, in many respects, analogous to those of the human glottis. This is the *reed* of the *bagpipe drone*. An experimental sonifier of this kind may be constructed from a common quill, in the following manner:

Remove from a new quill the feathered end and the dry and tough matter within and at the other end of the quill, so as to leave only the brittle portion. Seal up one end of this tube with wax, and cut a tongue in the side of it, beginning the slit near to the wax. Insert the sealed end within the mouth.

With this instrument, the following principles may be exemplified:

If the slit, and, consequently, the vibrating tongue, be *short*, the sound will be shrill and strained; and, if the tongue be gradually lengthened, the pitch of its note will become deeper and more mellow with every increase.* In an analogous manner the glottal aperture is contracted in length when producing high tones, and elongated in producing grave sounds.

If the tongue of the reed or quill project so as to leave too open an aperture, the air will pass below the tongue without setting it in vibration; and, consequently, no sound will be heard except that of the rushing of the air, more or less audibly, according to the degree of openness of the aperture, and the force of the breath. This state of the reed is analogous to that of the glottis in *whispering*. Every

* The vibrating length of the tongue may be altered by means of a piece of thread.

gradation of sound, from the softest breathing to the strongest sonorousness, may be produced either with the reed or by the glottis.

If the tongue of the reed lie *quite close,* so as completely to cover the aperture, no sound or breath will issue; and if, while the effort of expiration is continued, the tongue should suddenly take the vibrating position, the sound will burst out with abrupt energy, proportioned to the force of the preceding silent effort. This condition and action of the reed are analogous to those of the glottis in many cases of *stammering.*

To keep the reed in a position for vibrating, an aperture must be maintained; and, to produce voice, the edges of the glottis must be in close approximation, without being absolutely in contact. Too much openness of the aperture renders the tone husky; and too little openness gives a strained and inflexible character to the voice. It is important to all persons who labor under difficulties in the management of the voice, to be perfectly familar with the process by which vocality is produced; to make themselves so by experiment; and to aim at the improvement of their vocal powers, by applying the same principles which they find to govern the mechanism of analogous sounds.

It will be observed, on experimenting with the reed or quill, that the sound does not begin by a *gradual process* from the rustling effect of breath to pure sonorousness, but with a quick explosiveness; as if the vibrating tongue shut up the aperture for a moment on first feeling the pressure of the air; or, rather, as if its first vibration occluded the aperture for an instant. So, in the production of pure glottal sound, there is a sharp and instantaneous opening of the voice, as if from a momentary holding in of the breath before the vocal emission. This effect is a great beauty in vocalizing; a source of ease, power, and distinctness as well as of grace. When the voice is otherwise commenced, much breath is wasted before vocality is obtained, and a clear resonant voice can hardly be produced by the loose expiration.

M. Garcia, of Paris, and other scientific singing-masters, prescribe exercises on this *coup de la glotte* as the best means of purifying and strengthening the vocal tones. And to speakers the principle is not less important than to singers.

The following modes of practice will enable any person readily to master this glottal action.

Inhale a full breath, and *retain it for a second;* then, with force and abruptness, eject a vowel sound, with open mouth, directly from the throat; avoiding, in the most forcible effort, any bending, or other action of the head or body.

EXERCISE—COUP DE LA GLOTTE.

A, E, I, O, U, Ah, Aw, Oi.

When this has been sufficiently practiced on individual sounds, enounce, *in the same way,* but with abated force, as many repetitions of each vowel as can be effected with one expiration; taking care that after each sound, *the chest is held up,* or the next vowel will probably lose the crisp initial quality. The speaker should apply this principle of vocal formation to all INITIAL VOWELS.

Imperfectly sonorous voice requires a much greater expenditure of breath than clear tone. If the preceding theory has not made the reason of this obvious, the *prolongation* of vowels will prove the truth of the observation. The *less clear* the sound, the *greater is the waste* of breath; the more sonorous the voice, the more easy is its production, and the less exhausting its continuous exercise.

The following exercise will strengthen the lungs, and at the same time purify the quality of the voice.

EXERCISE—PROLONGED VOICE.

Expand the chest, so as *fully* to charge the lungs with air, and, after pausing for a moment without emission of breath, sound the monophthongal vowels.

E, Eh, Ah, Aw, Oo,

as long as the sound can be steadily maintained. When the voice wavers and becomes feeble, stop, and begin again. After practice, and acquirement of the art of maintaining a steady, equable pressure on the lungs, the vowels should be continued *purely* for the space of about thirty seconds.

Another very useful exercise, and one by which the action of the glottis will be distinctly *felt,* consists in again and again *shutting off* and *recommencing* the sound. We may be understood, when we say that this is merely the preceding exercise, with the vowels *clipped* up in little pieces, instead of running out in one unbroken length. Each breath should last, at least, as long in this as in the preceding exercise. This principle of finishing sound should be applied to all FINAL VOWELS.

When the voice is feeble, or the lungs apparently weak, the above modes of practice will be of much benefit. To assist in the development of the chest and voice in children, the delighted urchins should be encouraged to such noisy bawling, at convenient time and place. A strong middle tone is the best for ordinary practice, but, to strengthen particular tones, the voice may range from low to high, or from high to low. When the ordinary pitch of the voice is too high, the vowels may be practiced from high to low, beginning softly, and increasing in strength of sound as the voice descends. To strengthen the higher tones, which is seldom an object of necessity to a speaker, the voice may increase in energy as it ascends. In this way, the compass of the voice may be much extended, and a degree of mellowness and flexibility, seldom acquired without art, will be attained.

The *inflexions* of the voice will be treated of in a subsequent chapter.

We have hitherto considered only the *formation* of voice. There are peculiarities of tone, arising from the way in which the voice is directed,—from the position of the soft palate, teeth, lips, etc. The soft palate is a curtain depending from the back of the mouth with a small tongue-like prolongation, called the uvula. The soft palate performs many important functions in vocal modulation and articulation. It acts as a *valve* to cover the inner nasal apertures, and so prevent the issue of breath or voice by the nostrils. The *contact* of the soft palate with the back of the tongue forms the English element NG, in which the voice passes entirely through the nostrils; its *approximation* to the tongue divides the vocal current into an oral and a nasal stream, and thus gives the peculiar character to the French elements *an, en, in, on, un,* and causes the

> "nasal twang,
> Heard at conventicle, where worthy men,
> Misled by custom, strain celestial themes
> Through the pressed nostril, spectacle bestrid."

The soft palate is in the same way *approximated* to the tongue for the English articulations M and N; in forming which, the voice *escapes* by the nose only, but reverberates in the mouth; where it is shut in, by the lips for M, and by the tongue and front of the palate for N. The action of the soft palate demands the attention of all who would speak with purity of voice and propriety of articulation.

EXERCISE—SOFT PALATE.

Let the student place himself before a glass,—his back to the light,—and, opening his mouth, inhale breath deeply but *noiselessly.* If he does not, in this

process, elevate the soft palate, and depress the tongue, so as to form a visible *arch* of considerable height and breadth, he will be the better of practice for that purpose. Let him *retain* the velum* at the elevation he obtains, as long as possible, dwelling on the open vowels *ah* and *aw,* without allowing it to fall. He will distinctly *see* the position of this organ in sounding these vowels, and he may be able, by sensation and partial observation, to maintain it in the same position in sounding the closer vowels, e, eh, oh, oo, etc. In this way, a NASAL TONE will be purified, and that most disagreeable blemish of speech removed.

A GUTTURAL tone of voice arises, in a great measure, from the too close approximation of the tongue and soft palate, by which the uvula is laid in the way of the vocal current; frequently a guttural tone arises from enlarged glands (the tonsils) and from contraction of the arch of the fauces, from whatever cause arising. The nature of the peculiarity indicates the means of cure. The more the arch can be *expanded,* the less guttural vibration can there be. So far as faulty habit is the cause of the guttural tone, it will be susceptible of easy correction.

The quality of the voice is also affected by the position of THE TEETH. All the vowels may be sounded with the teeth closed, and they may all be sounded with the teeth considerably separated; but the tone of voice is very different in these cases. When the teeth are closed, the vocal current strikes against them, and becomes deadened and muffled. In the close vowels, *ee* and *oo* especially, the sound is frequently still farther deteriorated in quality by a degree of *vibration* in the teeth.

The teeth should never be closed in speech, but, on the contrary, should be kept as open as possible, to allow the voice to come freely out from the seat of its formation.

The LIPS, too, influence the tone of the voice. The best advice for any peculiarity arising from a faulty disposition of the lips, is—*never use these organs in speech where their action is not indispensable.* The most common faults are projection, and pursing, or contact of the corners of the lips, or of one corner, contracting the aperture or making it incline to one side of the mouth. By these ungraceful habits, the quality of the voice is variously affected. The lips should take the form of the range of the teeth,—but without constraint,—and should move in a vertical direction only. Any great deviation from this rule is inelegant, and injurious to the tone.

Huskiness of voice, we have thus seen, is owing to a faulty formation of voice—to insufficient glottal vibration; and other peculiarities of tone arise generally from modifications of the mouth—the channel through which the vocal current flows. *Exercise,* conducted on natural principles, will be found the best specific for improving the voice, strengthening the lungs, and regulating all vocal action.

VOWELS.

The glottis produces voice; the shape of the mouth gives VOWEL character to the voice. Variations of musical pitch, of acuteness and gravity in the sounds, are caused by variations in the larynx† and glottis; but all *vowel* variations are produced by changes in the shape of the oral passage. The action of the hand enclosing the open end of a vibrating reed or quill modifies the sound sufficiently

* Velum pendulum palati—or soft palate.

† The larynx is the box-like arrangement of cartilages at the top of the wind-pipe, in passing through the aperture of which (the glottis) voice is produced.

to illustrate the effect of similar modification on the glottal sounds. Thus: close the hand around the quill, so as to leave a very contracted aperture for the passage of the sound, and then expand the fingers, and the vowels *oo* and *ah* will be produced. Reiterate the actions rapidly, and the hand will give out no bad imitation of a cat's wawling —*w-ah-oo—w-ah-oo—w-ah-oo.* The apparatus of the mouth is wonderfully calculated to effect the most minute and delicate changes with definiteness and precision. Nature must ever be infinitely superior to art; yet art has accomplished the mechanism of the vowel sounds in various ways, and has even effected intelligible imitations of all the elements of speech. De Kempelen constructed a speaking machine; and, recently, the highly ingenious speaking automaton of Herr Faber was exhibited in this country.* Mr. Willis, another philosophical inquirer into the mysteries of this subject, found that the vowel sounds might be imitated by drawing out a long, straight tube from a vibrating reed. "In this experiment he arrived at a curious result; with a tube of a certain length the series of vowels

i, e, a, o, u (=ee, ā, ah, oh, oo),

was obtained by gradually drawing it out; and if the length was increased to a certain point, a farther gradual increase produced the same sequence in an inverted order, u—o—a—e—i; a still farther increase produced a return to the first scale, and so on."

Our own experiments corroborate this sequence as the natural order of these five vowels; but we have carried out the principle much further, and constructed a scheme which includes, in regular progression, all the vowels in the English language, besides several others characteristic of dialects, and of the French and other languages. The arrangement, besides, admits of the addition of any other recognizable vowel formations, so as to form a complete scale of natural or possible vowel sounds.

If the second of Mr. Willis's series, e (=ā), we reasoned, can be obtained by mere elongation of the sound conductor, beyond its dimensions for the production of the first i (=ee), the change from ee to ā will probably be gradual; and, if so, the interval between the two sounds must yield some intermediate varieties of vowel quality. It should be possible, we thought, to pass from sound to sound by such delicate progression as to exhibit vowels in the same softly blending relation that is seen in colors, where melting shades almost imperceptibly lead the eye from one to another of the prismatic series. And this is possible.

The following simple but conclusive experiment was one of our early landmarks in the discovery of vowel principles; and it may serve to give the student a clear idea of the nature of vowel formation, and of the vowel unity of the voice as emitted from the glottis.

Prolong with open mouth the vowel *ah,* and, while doing so, gradually cover the mouth with the hand, by laying the fingers of the right hand on the left cheek, or *vice versa.* At every stage of this process, the ear will recognize a change of vowel quality; the sound will become modified to

U(rn), A(ll), O(re), O(we), Oo(ze),

* This instrument illustrated perfectly the mechanism and mutual relations of the elements of speech. It was operated on by a key-board like that of a piano, containing a key for every attitude of the mouth, with one additional key governing the sound-producing part of the apparatus, and an extra key for opening the nasal tubes. Thus: on pressing the key for P, an explosive emission of air came from the anterior part of the mouth; on pressing the P key and the voice key simultaneously, the sound of B was produced; and on pressing the P key, the voice key, and the nasal key, the sound of M was heard. A separate set of keys acted on the vocalizing apparatus so as to produce changes of musical pitch; and by using both ranges of keys the instrument sang as well as spoke.

by the mere contraction of the external aperture, while the internal channel of the mouth remains uniformly extended.

There are two great agents in vowel modification, the lips and the tongue. The lips, by their approximation, externally contract the oral aperture; and the tongue, by its elevation towards the palate, internally diminishes the oral channel. The effect of the *labial* approximation is, what we have seen to result from covering the mouth with the hand, viz., modification of the vowel quality from *ah* to *oo*. The effect of the lingual approximation is, similarly, to modify the sound from *ah* to *ee*.

The arrangement of the lips, then, produces one set of vowels, and that of the tongue, another; though, perhaps, few of the vowels owe their formation to either organ *independently* of the other. The labial vowels require an expanded internal channel; to maintain which the tongue is slightly depressed at the root, as the labial aperture contracts; and the lingual vowels require a clear and broad external aperture; to maintain which the lips are gradually elongated as the tongue rises within the arch of the palate. This gives to the vowels from *ah* to *oo* a solemn and sombre character, associated as their mechanism is with a "long" face and gloomy contraction of the lips; and to the vowels from *ah* to *ee,* a sprightly, mirthful character, associated as their mechanism is with a "broad" face and smiling elongation of the lips.

From the mutual independence of the vowel modifiers—the lips and the tongue—it is obvious that their vowel positions may be assumed either separately or simultaneously, or variously combined. This is an important fact, to the discovery of which we were led in our experimental endeavors to find the exact formation of the vowel in *sir, her,* etc., and of a peculiar, close sound, which some Irish pupils gave for the vowel *oo*. When the principle of separate and simultaneous labial and lingual vowel formation revealed itself, these and all other tested sounds found at once their proper place in the triple scale of *lingual, labial,* and *labio-lingual* vowels. In the labio-lingual class will be recognized those common French and German vowels, which give such trouble to English learners of these languages,—the *u* and *eu* of French, or *ü* and *ö* of German. A knowledge of the mechanical formation of these sounds will remove all difficulty in pronouncing them. With the exception of the sound in *sir, her,* etc., the labio-lingual contains no genuine English vowel.

We recognize altogether eight vowel positions on the lips, and the same number on the tongue, with, of course, an equal number of combined or labio-lingual positions; giving in all twenty-four varieties of vowel sound. But the plasticity of the organs is so great, that shades of vowel quality are endless, arising from infinitesimal differences in the relative positions of the lips and the tongue. The number of possible variations can as little be estimated as the number of possible shades of color. The eight vowel positions which we shall now describe form a well defined and standard scale, to which all differences in dialects and individual pronunciations may be referred, and by which irregularities may be corrected.

STANDARD SCALE OF VOWELS.

FIRST VOWEL POSITION.

The first and last of Mr. Willis's series are the close labial and the close lingual vowels *ee* and *oo*. The approximation of the organs in forming these vowels is so close, that any further contraction of the oral aperture creates a *vibratory effect upon the tongue or the lips,* and so converts *ee* into the articulation Y, and *oo* into the articulation W.

The *simultaneous formation* of *ee* and *oo* produce the peculiar Irish sound before mentioned, which is also heard in some of the American dialects, instead of *oo* or *ü*.

EE, then, is the *1st lingual vowel; oo,* the *1st labial vowel;* and the *compound formation of* ee and oo, the *1st labio-lingual vowel.*

SECOND VOWEL POSITION.

The tongue a little depressed from its elevated position at *ee* gives a vowel intermediate in form and effect to *ee* and *ā*. This is the sound of *i* as in *ill, is, it, etc.,* which is therefore the *2nd lingual vowel.*

The lips lightly separated from their close position at *oo* produce a sound intermediate to *oo* and *ō,* which is heard in some English dialects instead of *ō;* as, in Lancashire, "Put some coal" (*almost,* but not quite, *cool*) "on the fire." This, then, is the *2nd labial vowel.*

These two formations, combined, produce an appreciably different sound from the first labio-lingual vowel—intermediate to it, and the next vowel û French or ü German. This is the *2nd labio-lingual vowel.*

THIRD VOWEL POSITION.

A further slight enlargement of the oral apertures, by the depression of the tongue, or by the separation of the lips, produces *ā,* the *3rd lingual,* and *o,* the *3rd labial vowel.*

The union of these formations gives the French sound of *u,* as in *une, būt, lū, etc.,* which is therefore the *3rd labio-lingual vowel.*

It is to be remarked of the two correspondent sounds *ā* and *ō,* as a curious peculiarity, that in English usage they are both diphthongally terminated with the closest vowel of their respective classes,—*a* with *e,* and *o* with *oo.* The omission of this final element of these beautiful vowels is a marked provincialism.

FOURTH VOWEL POSITION.

A further slight opening of the vowel apertures from the 3rd lingual position produces a sound heard (short) in Scotland instead of the 2nd lingual, in such words as *ill, in, sit,* etc., and very generally heard (long) in London instead of the 3rd lingual, as the radical part of the diphthongal *ā;* as in *day,* pronounced nearly but not quite *deh-y;* and, from the labial position, a correspondent enlargement produces the monophthongal sound of *o* as heard in English before *r,* in such words as *ore, four, soar,* etc.; and in French as the regular sound of *au, eau,* etc.

The labio-lingual vowel resulting from the combination of these positions occurs as a provincial peculiarity in England, instead of the more open vowel correctly heard in such words as *sir, her,* etc.

FIFTH VOWEL POSITION.

An increased depression of the tongue gives the formation of the sound heard in *e*(re), *ell, end,* etc., the *5th lingual vowel;* and a correspondent increase of the labial aperture from *o*(re) gives the vowel heard in *all, saw, on,* etc.,—the *5th labial formation.*

From the combination of these positions results the vowel represented by *eu* in French, and by *oe* in German.

SIXTH VOWEL POSITION.

The next degree of openness produces, in the lingual series, the sound heard in *an, at,* etc.; and in the labial series, the vowel heard in Scotland, in such words as *up, urge,* etc.

The combinations of these positions gives the peculiar English sound which is associated with the letter *r;* as in *sir, her, earn, paper, martyr, theatre,* etc.

As before observed, few of the vowels owe their formation to labial or lingual position alone; there is for every vowel a necessary arrangement of the whole mouth; but the preceding sounds are formed by so evident a proportion of the one over the other, that their being called respectively *labial* or *lingual* vowels, will be perfectly intelligible. The sounds which follow, however, are dependent chiefly on the *internal* arrangement of the mouth, and do not so obviously fall under the same classification. The lips are well spread and open, and the tongue well depressed, so that the changes of organic arrangement are less manifest; but the vowels are all in regular progression, from close labial and close lingual forms, and do, therefore, truly belong to one or other of these classes. Positions intermediate to any two, likewise, may still be formed, though, from the necessarily slight differences between their effects, ears untrained to very accurate observation, may think them, in their separate utterance, "distinctions without difference." On such minute distinctions, however, often depends the very important difference between a cultivated speaker and an uneducated or a provincial one.

SEVENTH VOWEL POSITION.

The next more open vowels than *a*(n), the 6th lingual, and *u*(p) Scotch, the 6th labial, are two sounds intermediate to these vowels and the most open sound *ah.* The former is heard in such words as *ask, past, bath,* etc.; and the latter is the regular sound heard in the English utterance of such words as *up, urge,* etc. Let a Scotch and an English speaker pronounce any words of this latter class, and the difference will be readily recognized by any ear.

The 7th labio-lingual position gives a shade of sound which occurs as one of the many modes of pronouncing the vowel in *sir, her, fir, girl, earth,* etc. These words, in district and individual peculiarities, exhibit every possible variety of labio-lingual sound, from the close *seur* of the rustic Yorkshireman, to the open *sah* of the untaught Cockney.

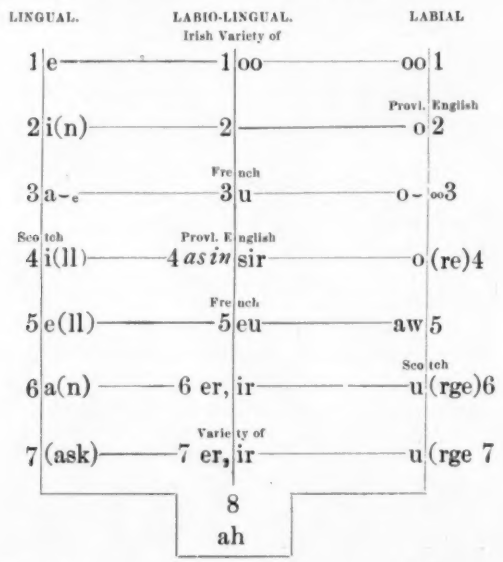
EIGHTH VOWEL POSITION.

In the open vowel *ah,*—called the Italian *a,*—both classes of vowels terminate. The lips are fully spread, the tongue lies flat, and the whole mouth is an even neutrality between the two modes of vowel formation.

The subjoined diagram may help to make this altogether new subject more intelligible to the reader. Let those who feel interested in this department of knowledge test our classification by experiment, and we believe that its correctness will not be disputed. If this be so, what an assistance must it prove to the student

in acquiring, and to the teacher in imparting, foreign pronunciations!* Even those common French sounds, *u* and *eu*, are so awkwardly attempted by our countrymen, in the absence of a knowledge of their formation, that they are often imperfectly acquired, even in a four or five years' course of instruction in French. Yet, with a knowledge of the mechanism of these sounds, who could be four hours, or even many minutes, in mastering them?

GENERAL VOWEL SCHEME.


LINGUAL.
LABIO-LINGUAL.
Irish Variety of
LABIAL
1 e — 1 oo — oo 1
Provl. English
2 i(n) — 2 — o 2
French
3 a-e — 3 u — o-oo 3
Scotch
Provl. English
4 i(ll) — 4 as in sir — o (re) 4
French
5 e(ll) — 5 eu — aw 5
Scotch
6 a(n) — 6 er, ir — u (rge) 6
Variety of
7 (ask) — 7 er, ir — u (rge 7
8
ah

This table contains all the vowels that occur in modern European languages, besides several dialectic varieties. Any new sounds that may be met with in other languages may be added, so as to complete the scheme for any or for every language. In this way a system of notation might be constructed, by which all the sounds of any dialect might be represented intelligibly to readers of whatever country or tongue. A table of all recognized elements of speech on this natural principle of arrangement would be one step towards the realization of that indefinite philological speculation,—a universal language.

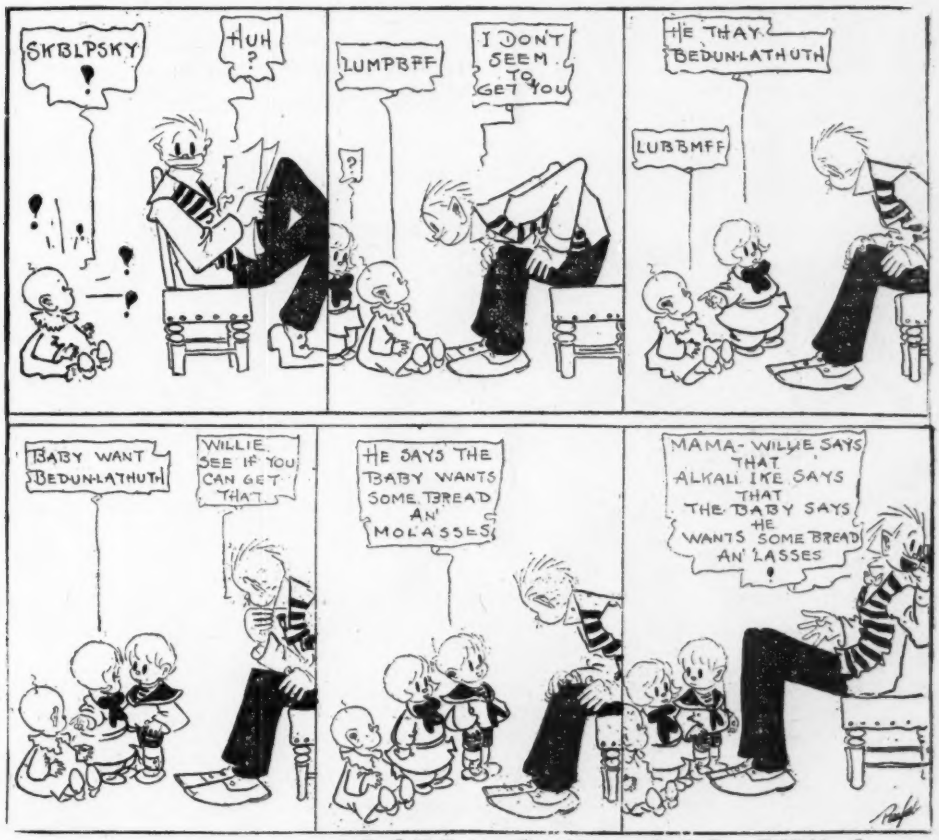
To find the place of any vowel not included in our scheme, put the mouth in the position for the closest vowels (*e, oo,* and the *intermediate sound* respectively), and from each of those starting points, very slowly enlarge the oral aperture till the most open position (*ah*) is reached,—of course continuing the voice the whole time. In one or other of the three gradations of sound so produced, the ear should be able to recognize the vowel sought for, and so ascertain its exact formation. By this experiment, too, the accuracy of the three sequences in our scheme may be satisfactorily tested.

We have given the formation of *twenty-two* vowels:—of these, *thirteen* are genuine English sounds. The mechanism and application of the latter we shall later examine minutely.

* Since this was written, the author has had the gratification of hearing from a former pupil (the Rev. Mr. Robb, Missionary in Africa) that he had found the Vowel Tables in this work, and the principle of numerically noting vowel sounds, a very great assistance in acquiring the native dialects of Africa.

(To be continued.)

DICTIONARIES OF SOUNDS NOT BY ALEXANDER MELVILLE BELL


SKIBLPSKY
!
HUH
?
LUMPBFF
?
I DON'T SEEM TO GET YOU
HE THAY BEDUNLATHUTH
LUBBMFF
BABY WANT BEDUNLATHUTH
WILLIE SEE IF YOU CAN GET THAT
HE SAYS THE BABY WANTS SOME BREAD AN' MOLASSES
MAMA- WILLIE SAYS THAT ALKALI IKE SAYS THAT THE BABY SAYS HE WANTS SOME BREAD AN' LASSES

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SPEECH-TEACHING IN AMERICAN SCHOOLS FOR THE DEAF

THE *American Annals of the Deaf* for January, 1914, contains valuable statistical tables relating to pupils and teachers in American schools for the deaf.

From these tables, after correcting certain errors of tabulation, which will be noted in the next number of the *Annals*, we learn that during the year ending November 10, 1913, the number of schools decreased from 154 to 149, due chiefly to the consolidation of several of the day-schools in Chicago; the number of pupils increased from 13,193 to 13,391; the number of teachers, exclusive of industrial teachers, from 1,398 to 1,419; the number of articulation teachers from 1,013 to 1,057; the number of industrial teachers from 400 to 403.

During this period the total number of pupils increased from 13,193 to 13,391; the number taught speech from 9,878 to 10,070; the number taught wholly or chiefly by the oral method from 8,661 to 8,723; the number taught by a combination in which both oral and manual or silent methods were prominent from 1,217 to 1,347, and the number by manual methods from 3,315 to 3,321.

The following tables are compiled from the *American Annals of the Deaf*, with percentages computed from them.

TABLE I—PROGRESS OF SPEECH-TEACHING IN AMERICA, AS REPORTED IN THE ANNALS

Year.	Total schools.	Total pupils.	Number of pupils taught speech			Percentage of pupils taught speech.		
			A	B	C	A	B	C
1893	79	8,304	4,485	2,056	80	54.0	24.7	0.96
1894	82	8,825	4,802	2,260	109	54.4	25.6	1.24
1895	89	9,252	5,084	2,570	149	54.9	27.7	1.61
1896	89	9,554	5,243	2,752	166	54.9	28.8	1.74
1897	95	9,749	5,498	3,466	162	56.4	35.6	1.66
1898	101	10,139	5,817	3,672	116	57.4	36.2	1.14
1899	112	10,087	6,236	4,089	128	61.8	40.5	1.27
1900	115	10,608	6,687	4,538	108	63.0	42.8	1.02
1901	118	11,028	6,988	5,147	73	63.4	46.7	0.66
1902	123	10,952	7,017	4,888	63	64.1	44.6	0.58
1903	128	11,225	7,482	5,433	100	66.6	48.4	0.89
1904	133	11,316	7,601	5,508	154	67.2	48.7	1.36
1905	128	11,344	7,700	5,733	149	67.9	50.5	1.31
1906	132	11,648	7,846	5,645	152	67.4	48.5	1.31
1907	137	11,648	8,040	6,500	148	69.0	55.8	1.27
1908	141	11,990	8,299	6,760	143	69.2	56.4	1.19
1909	144	12,046	8,590	7,238	166	71.3	60.1	1.38
1910	145	12,332	8,868	7,562	134	71.9	61.3	1.09
1911	148	12,588	9,302	8,119	158	73.9	64.5	1.25
1912	154	13,193	9,878	8,661	179	74.9	65.6	1.35
1913	149	13,391	10,070	8,723	135	75.2	65.1	1.00

A. Number taught speech.
B. Number taught wholly or chiefly by the Oral Method.
C. Number taught wholly or chiefly by the Auricular Method.

TABLE II—INSTRUCTORS OF THE DEAF

Year.	Total teachers.	Industrial teachers.	Not including industrial teachers.		
			Total teachers.	Articulation teachers.	
				Number.	Percentage.
1893	....	...	765	331	43.3
1894	....	...	784	372	47.4
1895	....	...	835	397	47.5
1896	....	...	879	427	48.6
1897	1,188	260	928	487	52.5
1898	1,253	304	949	530	55.8
1899	1,309	323	986	561	56.9
1900	1,353	343	1,010	588	58.2
1901	1,385	358	1,027	641	62.4
1902	1,388	349	1,039	664	63.9
1903	1,438	373	1,065	696	65.4
1904	1,453	328	1,125	734	65.2
1905	1,491	332	1,159	749	64.6
1906	1,525	351	1,174	765	65.2
1907	1,552	359	1,193	767	64.3
1908	1,648	394	1,254	836	66.6
1909	1,634	381	1,253	860	68.6
1910	1,673	370	1,303	896	68.8
1911	1,706	389	1,317	962	73.0
1912	1,798	400	1,398	1,013	72.5
1913	1,822	403	1,419	1,057	74.5

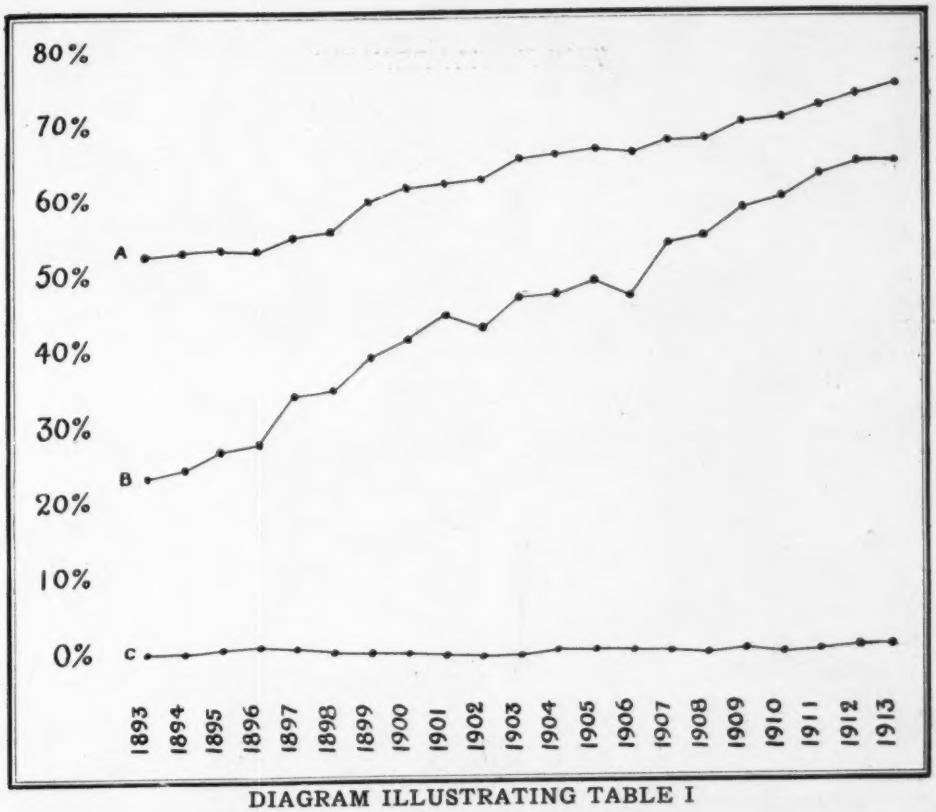


DIAGRAM ILLUSTRATING TABLE I

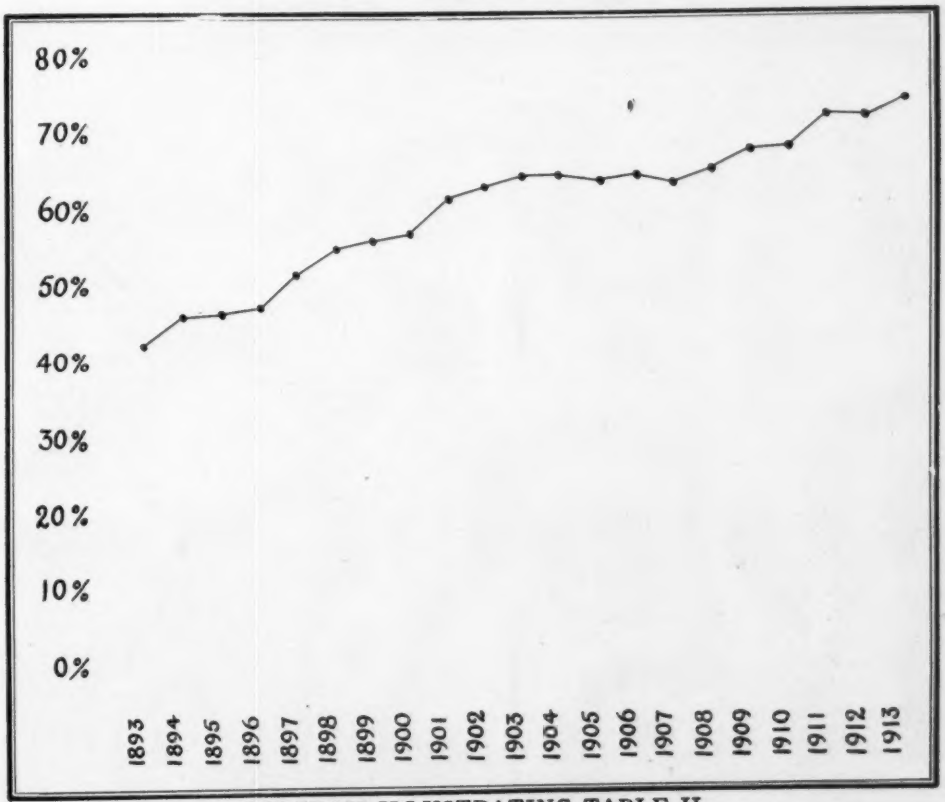


DIAGRAM ILLUSTRATING TABLE II

CULTIVATION OF THE READING HABIT

BY LINNAEUS ROBERTS

ONE of the results of institution life is the creation of a class of social beings instead of the isolated, hermit-like members of the world of the deaf. Nothing could be more natural than this—that deaf boys and girls, who spend from eight to ten years of the most impressionable part of life in the society of their own kind, should grow into a special fondness for all the social amenities. The majority of our graduates, not content with their former solitude, as quickly as possible move into communities where congenial society can be found; and by congenial I do not mean the kind that requires the use of pencil and tablet as a means of communication.

When I see a number of deaf persons at a social gathering taking in and giving out in unalloyed enjoyment, untrammeled by convention and unrestricted by policy, it is easy to conclude that the wonderfully gift-laden century just past has brought no greater privilege than this—the possibility of intelligent, enjoyable intercourse. I would not have it otherwise. But there is danger that many of our pupils may come to look upon social functions as the all in all, and in time to depend on them for most of the enjoyment to be extracted from life. It is possible that their ideas of literature may be confined to their text-books, which they would gladly lay upon the shelf with their retirement from school.

ENLARGING THE HORIZON

Certainly no plainer nor more pleasurable duty lies before the teacher than the enlarging of the pupil's horizon. He should know of the companionship to be found in good books and know how to form the acquaintance of writers whom he has never seen in the flesh, but may come to know as he knows none with whom he has personal contact.

In order to reach this happy consummation, there must be an early beginning and a wise and persistent continuing. If the pupil does not like to read, he must be led to like it—I almost said he must be made to like it. Some have set their wills in this direction, having determined to acquire a taste for reading. These need only directing and encouragement. Others give up easily because they understand so little of what they find on the printed page. Their need is also direction and encouragement, supplemented by great firmness and patience.

READING WITHOUT UNDERSTANDING

There are ways and ways of getting over the pages of a printed book. Some of our pupils think they are reading when they merely spell words by the manual alphabet. We are well acquainted with the pupil who insists on knowing a sign for every word in his reading lesson, who can with great glibness reel off language by the yard, following the English order and giving a literal sign for every word; but when asked to reproduce in his own language, he is unable to give a single thought of what he has thus repeated.

I knew a girl who supposed she had learned to read before her hearing was lost. She could repeat the words of any language fluently—French, German, Russian, Choctaw, or what not. For a time she was considered quite a linguistic prodigy, until it was discovered that she had a most remarkable tongue for words, words, words, and but little exercise of the intellect was required in repeating them. Great was our surprise to find the young lady little more than a parrot in human form.

Every reader has one of two objects in view—amusement or entertainment and instruction or mind improvement. With children beginning to read, the latter object is for a long time lacking and must wholly rest with the one who directs. But if the reading habit is ever fixed it must be done while pursuing the

former object. This is the period when Mother Goose melodies have their charm; and while to older heads these are only senseless jingles, to the embryo lover of books they create an interest and retain it long past the age when such literature is considered a necessity.

"UNDERSTANDEST THOU?"

"Understandest thou what thou readest?" was the inquiry of the Apostle Philip to the Ethiopian. "How can I except some man guide me?" was the honest confession of the reader.

How much will our pupils read if they fail to understand what they find on the printed page? All too soon there must come a time when they must read by themselves; but there is a precious period when they can have one to guide, and a portion of each school day during those priceless years should be set apart for the exclusive purpose of teaching our little folks how to use a book.

The "reading hour" need not fill up sixty minutes. In the primary classes half that time, or even twenty minutes, would be better for each exercise.

FIRST READING LESSONS

The first reading lessons, as a matter of course, should be the language lessons of the school-room. These are detached sentences and short stories which follow the sequence method. The words are taken from the working vocabulary, all of which are reasonably well understood by the pupils. They mostly consist of lessons prepared by the teacher, the subjects being those with which the class is familiar, and an occasional excursion into fiction, with pupils' names as characters. As the school year nears the close these exercises are put into book form at the institution printing office and come to the pupils' hands as the "Vacation Reader." Each pupil takes a copy home for use in vacation. Parents are requested to see that no book be allowed to lie unopened long enough to collect dust. This year at our school the Vacation Reader is a partnership affair among the teachers of classes from the first to the fifth years.

USING THE "VACATION READER"

Professor Whitney defines language as "expression for the sake of communication." Another writer has said: "In order that the meaning of any communication may be understood, it is essential that the means of expression be appreciated by hearer as well as by speaker." And he further gives the two-fold object of reading literature as "not only to understand it, but to experience it; not only to apprehend it with the intellect, but to comprehend it with the emotions."

The brief, simple exercises in the Vacation Reader are experienced by the young folks for whom the book is prepared. On a cold winter morning, when the mercury has gone so low in the thermometer that no self-respecting eye dare follow it, there is indeed meaning in the exercise which greets the first-year class the moment they are settled in their seats:

Jack Frost is here.
We see him on the windows.
It is cold.
The trees have no leaves.
The flowers are gone.
Snow is on the ground.
It is winter.

And how real is anything pertaining to a birthday:

Today is Eva's birthday.
Eva's mother gave her a ring.
She likes the ring.
It is pretty.
Eva has a picture, too.

DEVELOPING THE IMAGINATION

My plea for a reading time in school is urged for a special reason. So much of our work is concrete, and the subject-matter of most text-books so matter of fact that the imaginative side of the pupil's mind is sadly neglected. If it is true that a person whose imagination has never been cultivated can know little of literature, and that "the best of literature must be received by suggestion or missed altogether," how important it is that much attention be given to this part of education.

If Solomon had reason to complain of overstudy and of the multiplicity of

books, what would he have thought of the present situation, when the family that is not "book poor" is the exception? Possessed of all the books they want and surfeited with the most attractive reading matter, our youths can scarcely believe the story of the boy Lincoln's poverty; much less can they appreciate the fact that the man, who so easily became President because he had the mental equipment for the high place, was in boyhood almost destitute of the appliances considered so necessary for aiding mental development.

WITH INTERMEDIATE PUPILS

When reading books are placed in the hands of intermediate pupils, teacher and class may spend the hour reading together. The pupils make lists of words not clearly understood. After reading the lesson through once, these words are quickly compared, duplicates stricken out, and one list passed to the teacher. Attention is then given to explanations not only of words in the list, but of all allusions—historical, biblical, or mythological—and of metaphorical and other obscure passages.

For example, the reading lesson is Whittier's "Barefoot Boy." Not one in the class of eleven pupils can give the import of the lines:

> "Prince thou art, the grown-up man
> Only is republican."

And in the passage:

> "All too soon these feet must hide
> In the prison cells of pride."

But one pupil ventures the guess that "cells of pride" might mean shoes.

If but one copy of the book or magazine is at hand, the exercise, if short, may be spread upon the blackboard by the quicker pupils, who always have more or less leisure at their disposal. The reading is thus greatly facilitated, for the hard words can be explained as the perusal progresses.

Discourage the use of catch words. I have known pupils who depended on these little clues which, as often as not, are misleading. *More than* in an arithmetical problem to them always means to add, and whenever *less than* occurs, it is a sure sign that the working process can be no other than subtraction. One of my pupils attached a most unwarrantable meaning to the word *flames,* interpreting it to indicate that the fire was put out, when in fact the house was burned down.

CULTIVATING UNDERSTANDING

There is but one way to break up this habit of depending on catch words, which is to get the pupil into the opposite habit of learning what a sentence as a whole means, with little regard for words as such. It is a great point gained in a class in grammar when pupils tell of their own accord that we can determine the part of speech to which a word belongs only by its use in a sentence. Knowing this fact thoroughly, it is an easy step to the process of determining the context and of making ideas stand out as complete pictures in the mind of the reader.

When our pupils can do this, a dictionary will no longer be the lame help so many of them have found it. When a word has two or more definitions, they will not be at a loss to know which suits the case in hand. But without this ability to sense entire sentences and paragraphs, we shall be compelled always to defend Webster and Worcester against the imputation of the pupil who does not "work" in vacation, but "ferments" on his father's farm, or the one who insists on making a "bodily ailment" to the police because the dictionary so defines a "complaint."

THE PROBLEM OF SELECTION

The problem of what to read and what to leave unread is one that perplexes most of us. It is especially hard for our deaf pupils to do their own selecting. They will not read as much as their hearing brothers and sisters, and it is of the utmost importance that the trend of their reading be toward the most helpful. It is almost impossible to make much of a path through the jungle of books and magazines.

To read the best books first is good ad-

vice, but who shall decide which are best? Emerson's rule, never to read a book until it is at least a year old, was not intended for this rapid age. But we can come to one fixed point and agree that it is better to know a few books well than to skim the many.

It may be that no new suggestion has been made in this paper, but it is offered with the hope that it may stimulate some one to try again where past efforts have seemed to be only failures. Let us bear in mind that, despite all that is done to lead our pupils to the light, when thrown upon their own resources many of them are doomed to grope through life. It devolves upon us to make them more independent.

NEED A DEAF CHILD'S SPEECH BE EXPRESSIONLESS?

BY HELEN LOUISE DYER

IN SPITE of the great strides which have been made in oral instruction during recent years in the great system of schools for the deaf in this country, it is still a rare thing to find a deaf child whose speech is natural and pleasing. Let us see why this is true and what can be done about it.

When the deaf child first enters school, he is taught to make the separate vowels and consonants in a way which is mechanically correct and which permits him to be understood without difficulty. Then he advances to the combination of letters simply for the combination's sake, and next these elements are made into words. After words have been mastered comes the sentence work. In order to establish in the child's mind the necessity for absolute clearness and accuracy, each word is given weight, and, quite naturally, the child thinks much more about the formation than about the meaning.

MECHANICALLY CORRECT UNNATURALNESS

Later on he is taught the use of accent and his English course shows him the relative values of clauses and phrases, so that he speaks with mechanical correctness when he thinks of these things. Yet none of this excellent training will create the slightest degree of naturalness until his mind has been reached from an entirely different point of view. He is using a medium of communication which is entirely foreign to him—far more so than another language is to us, for we have always known sound and the use of words to convey our feelings, while every phase of speech is new to a deaf child. His speech is like the playing of a person in the early stages of a musical education. That pupil knows the notes and has had practice in scales and exercises until he has become capable of reading simple compositions with accuracy, but the result is mechanical and monotonous, because music has not yet become one of his own natural methods of expressing feeling. When he attains to technical ease, he can appreciate the fact that composers wrote these things because they had something they wished to give to others, and music was to them the truest way of giving it to the world. In the same way the deaf child must learn that after he is mechanically able to form words with ease there is a much higher use to which he can put his knowledge.

The mind of the deaf boy or girl is no different from that of the more fortunate brothers and sisters. They can laugh, weep, love, and hate just as wholeheartedly as any one, and if the speech is reached through the imagination there is no reason why it may not become just as expressive as that of any other child.

FEELING AS WELL AS THOUGHT

It is always unwise to introduce a child to negative thoughts concerning life. Joy and spontaneity are the inalienable rights of childhood. Since these are in their very instincts, they are the qualities

which may be brought into their earliest speech. A teacher who believed in this method of training applied it to the teaching of her youngest pupils with marked success. When they were struggling to articulate "cat," she brought to the lesson a little toy black cat, and after showing the children that the word and the object had a connection she hid the cat in a corner. The pupils were then allowed to hunt for it, and the one who found it exclaimed "cat" with all the joy of discovery vibrating in his voice. Similar methods may be used with all sorts of words, always taking care to introduce a situation which will create feeling as well as thought.

It is not difficult to discover the general circumstances of a child's life, and a teacher who is really anxious to develop expression in speech will adapt this knowledge to her end and accomplish amazing results. The author recalls one such experience with a boy who was learning to say the word "river." In class he had with great difficulty been taught to form the word correctly, but he seemed to have no comprehension of what it meant. Hoping to impress the meaning upon his mind, the teacher showed him a picture of a beautiful river. Immediately his face lighted with joy, and taking a deep breath he spoke that little word in a manner that was positively lyric. His childhood had been spent on the banks of a large river, and the joy of his memories drove away all thought of difficulty in pronouncing the letters.

Up to this point we have considered the case of the teacher and child. How much greater is the opportunity of the mother to improve the speech of her child! When he is deeply moved from any cause, then is the time to lead him into expressive speech.

THE WORLD OF MAKE-BELIEVE

So few of us realize the pleasure to be obtained from an active imagination. The normal world of childhood is filled with "make-believe," and it is through these happy fictions that the mother may most effectively teach the lessons of every-day life. In the case of the deaf child this development of the imagination is more necessary than in the case of a normal child, for he will always be more dependent upon it. In the first place, he cannot have the assistance of sound in receiving impressions. Probably no one can realize until he is deprived of hearing how important a place it plays in all phases of our lives. The deaf child's imagination is his only means of filling this vacancy. In the second place, no matter how good a speech-reader he becomes, there are many times each day when a person speaks to him in passing, while working, or in a dozen other ways, which make it impossible for him to see more than half of the words. If his imagination is well trained it leaps to the rescue and finds the probable meaning, so that he is able to follow the trend of thought and keep in touch with those around him.

Considering it from another point of view, we see that the deaf child may control the inflections and general tone color of his own speech, so that, even before he is far enough advanced to speak very clearly, it is easy for the family to discover his meaning because the tone is supplementing the faltering pronunciation. During the earliest years of a child's life the mother can begin her training by creating as much interest as possible in the things with which he comes in contact. Then as he learns new words they will quickly become associated with his interests.

EMOTION-PRODUCING READING

Soon after entering school he becomes capable of reading little stories or poems, and then there is a rich field from which the mother or teacher may develop all sorts of emotional modulations in the voice. The choice depends largely upon the general environment of the child's life. It is not easy to create a strong enthusiasm for chickens, cows, brooks, and flowers in a child who has never been away from city pavements. The coun-

try-bred child can read with strong feeling and appreciation:

"A song, oh! a song, for the merry May.
The cows in the meadow, the lambs at play;
A chorus of birds in the maple tree,
And a world in blossom for you and me."

In taking up such a selection as that the pupil must be made to picture in his mind each phase of the joy expressed. No matter how long he requires to assimilate each idea, it must become a living, interesting picture to him before the effect will show in his voice. The cows in the meadow, the lambs playing together, the birds in the maple tree, and the blossoms everywhere are all worthy of separate thought and feeling.

A very simple little poem adaptable to this work is the nursery rhyme:

"I love little pussy,
Her coat is so warm," etc.

If a real cat, or a toy one with fur, is available, the child enjoys stroking it. He feels the soft warmth of its fur, and the words become associated with these sensations instead of being a mechanical effort repeated in a senseless sing-song.

One little deaf girl overcame a long list of faults of voice through the imaginative study of Stevenson's "My Shadow." Her mother showed her the "little shadow that goes in and out," and through her interest in this discovery she learned to say the first line in a tone vibrating with the joy of personal experience. Then came the discovery that the shadow changed shape in a most surprising manner "not at all like proper children," and the second stanza was added to the list of things which she said "as well as other people." For three weeks that shadow game provided a source of increasing interest, and at the end of that time the child thoroughly enjoyed repeating that poem because she had lived it and it was the spontaneous expression of her own thought and feeling.

A boy who loves to look at pictures of soldiers and at uniformed men on parade can easily be led into the enjoyment of patriotic poetry and stories if he makes-believe that he himself is a soldier defending his country. His voice will assume all the warmth and enthusiasm of a hearing boy's when the spirit of the words enters his heart.

There is one point which the mother or teacher must not fail to observe in her efforts to create strong feeling in a child. The interest and enthusiasm must not be allowed to constrict any part of the body. If the emotion causes his arms to tighten, his body to stiffen, or the breathing to be interfered with, stop at once and begin over again. The child is placing himself in a physical condition which renders even a hearing person incapable of good voice production. Let him stop, relax the entire body, and take several long, easy breaths before he begins again.

THE BROADER OUTLOOK

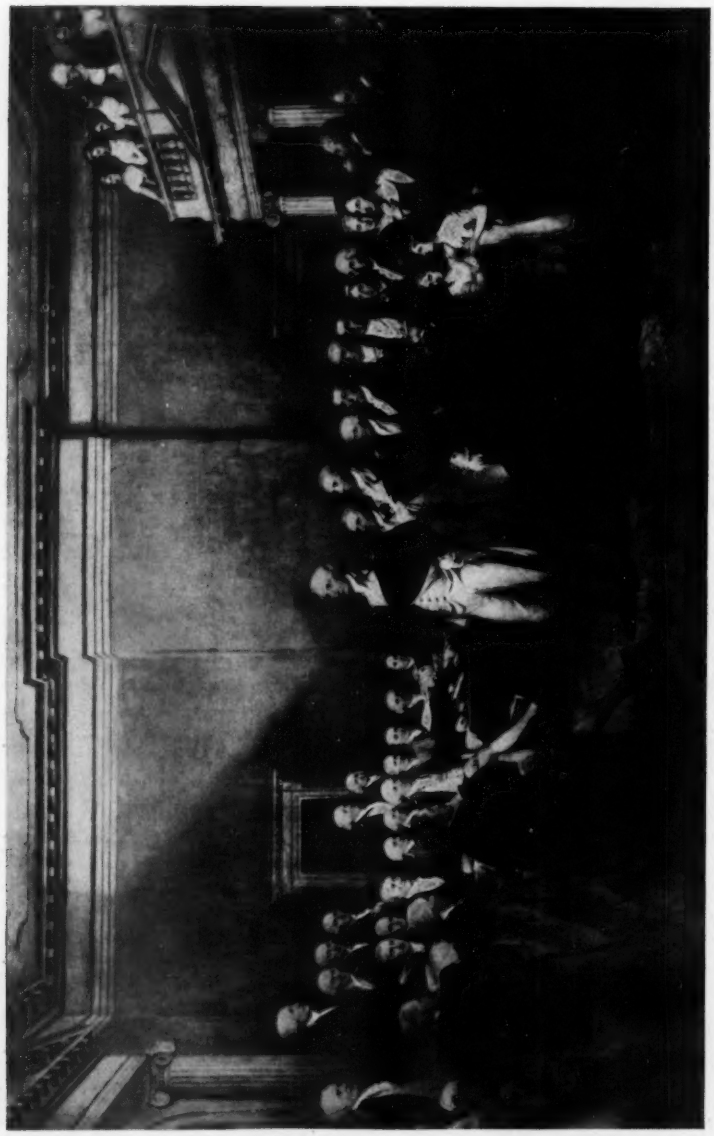
Let us not imagine that the child is the only one who derives benefit from this course of training. More than one person who has given this work to others has been astonished to discover how this habit of looking for the feeling—the heart behind the words—has broadened and sweetened her own outlook upon life, to say nothing of the improvement in her voice.

We have considered this method only in relation to the problem of the deaf child, but its usefulness is universal. Hearing or deaf, child or adult, there is not one of us who cannot find a new world of interest and a new power of appealing to the hearts of others if a vivid mental picture precedes and underlies all speech.

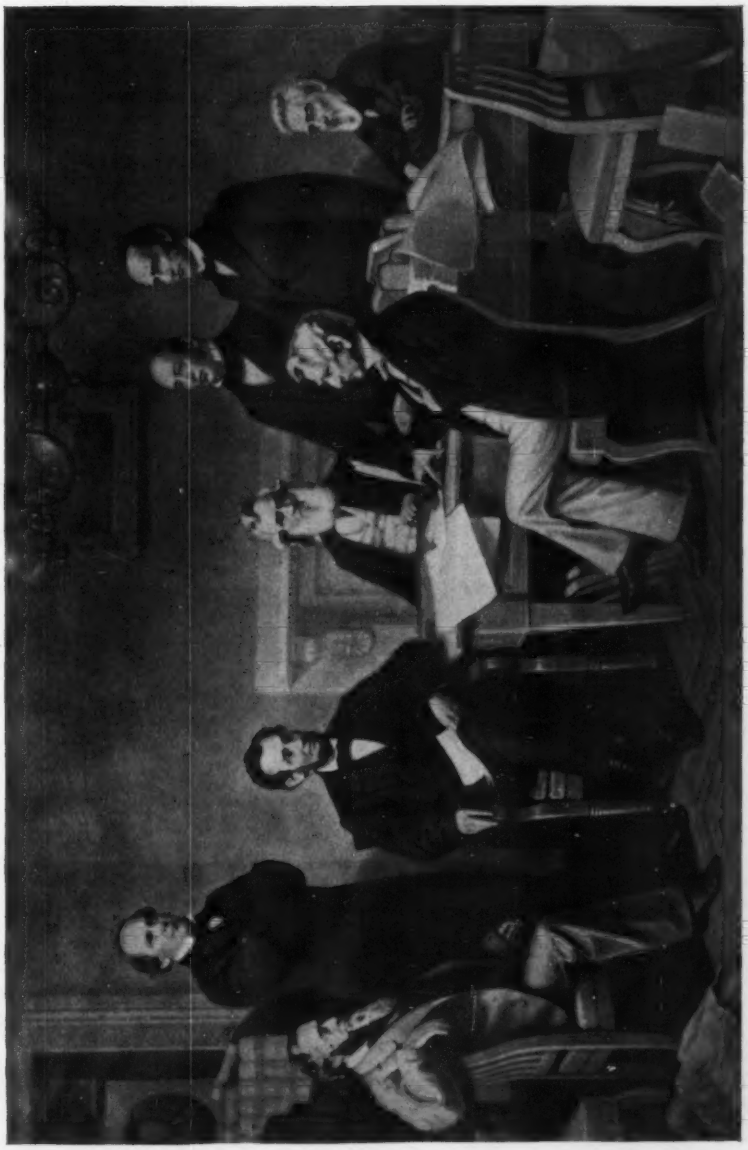
SUMMER TRAINING CLASS IN THE MÜLLER-WALLE METHOD

In response to various applications from teachers of the deaf who wish to introduce this method into their schools, another special summer training course will be held this year. Lessons will be given by Miss Bruhn at the Müller-Walle School in Boston, Mass., beginning June 22, 1914.

The growing demand for the Müller-Walle Method in the schools for the deaf all over the United States has proved its great value. It is especially suitable for the upper grades, but can be successfully used with any pupils who have acquired a certain command of language.

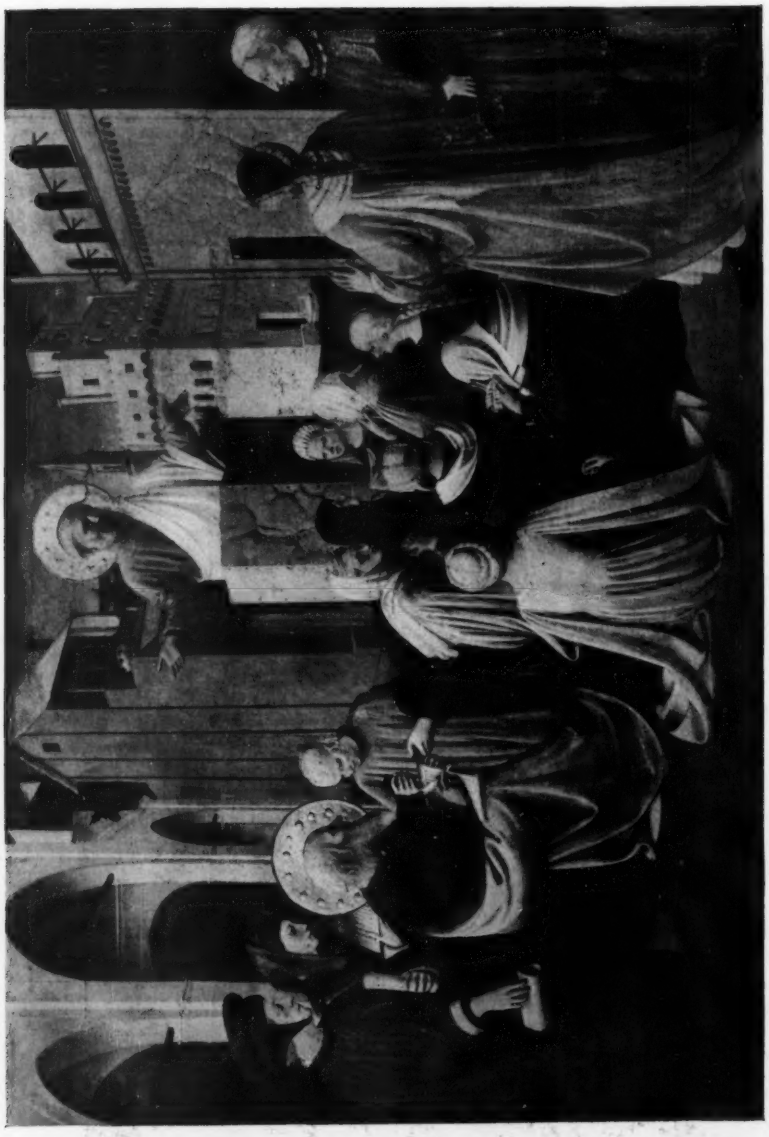


WASHINGTON RESIGNING HIS COMMISSION



FIRST READING OF THE EMANCIPATION PROCLAMATION

From painting by Carpenter



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טיטיאוסלמקמ אלסאדמקמלסמאמ מלנמלוכ
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